the OIL AND GAS JOURNAL
PUBLISHED WEEKLY FEBRUARY 6, 1961

"Depletion will be cut ...and maybe drastically"

. . . says Sen. John J. Williams in an exclusive Journal interview. p. 78

How much will compacts cut gasoline sales? ▸ 75

New FPC head favors a healthy industry ▸ 77

Marietta basin: Lush new gas area ▸ 82

Beginning: Five-part series on
Economics of a sound safety program ▸ 118

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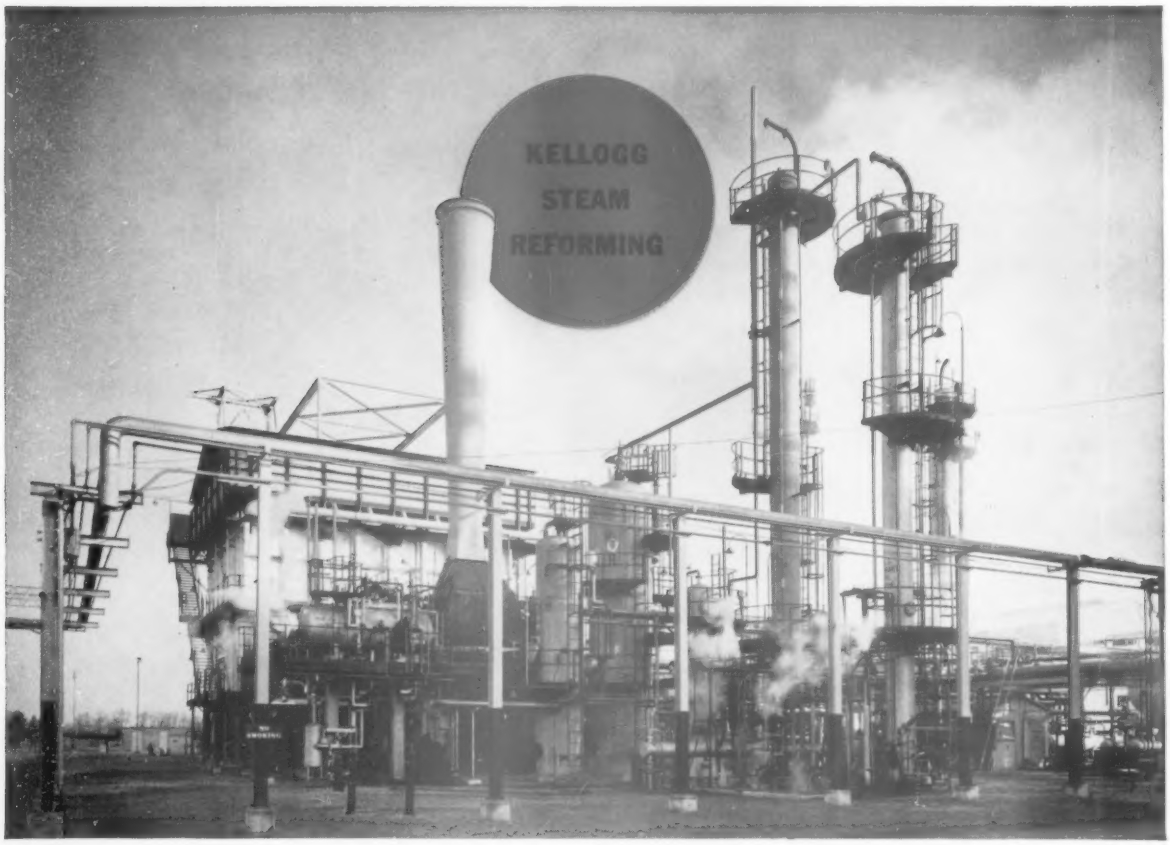
MAKING NEW AMMONIA PLANTS



STILL BETTER INVESTMENTS

Recent developments by The M. W. Kellogg Company in steam reforming make the production of ammonia by this process more efficient, more economical to install and operate, and more adaptable to individual conditions than ever before.

IN GAS PREPARATION, Kellogg now can design a plant for any combination of waste heat recovery suitable to the situation, and can achieve heat balance in the plant if desired. High pressure and low pressure feed can be used as economics dictate. Feedstocks can include naphtha as well as natural and refinery gas.

IN GAS PURIFICATION, Kellogg now can offer the optimum combination of methods to accomplish each step, including MEA and hot carbonate to remove CO_2, and copper liquor and methanation to remove CO.

Throughout the entire installation—from furnaces to synthesis converters—Kellogg's improved steam reforming process offers today's ultimate in low-cost, high-yield ammonia plants.

Among the many ammonia plants engineered and/or erected by Kellogg throughout the world since 1944 is the 300 T/D installation for Solar Nitrogen Chemicals, Inc. at Lima, Ohio, shown above. M. W. Kellogg has designed and is now erecting a second plant for Solar—at Joplin, Mo.

NEW BROCHURE gives detailed description and economic data on Kellogg's ammonia process. Write:

THE M. W. KELLOGG COMPANY

711 Third Ave., New York 17. *A subsidiary of Pullman Incorporated*

Offices of other Kellogg companies are in
Toronto, London, Paris,
Rio de Janeiro, Caracas, Buenos Aires

KELLOGG

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Pipelining

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By H. C. Bozeman
Pressures at 15 different points also indicated by supervisory control system being installed by Mountain Fuel Supply Co.

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A hot tie-in can be hazardous but Northern Illinois Gas Co. leaves nothing to chance.

General

What's the Total Cost of your Accidents? **118**
By James H. Herbert
Here's the first of a new series that will show how to reduce injury, fire, and vehicle accident frequencies in the oil industry.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Feb. 6, 1961

Compacts are becoming more popular in oil-company service:

Continental is going all out for compacts. New policy calls for buying compacts when the larger standard models in company's fleet come up for replacement.

Regional managers will have to justify an exception to the rule to buy any of the standard models.

Continental's experience in using more than 50 compacts during 1960 led to the move. Main advantage of small cars: Their roadability. Long overhangs on standard models proved obstacles in rough country terrain. Economy, naturally, is a motive too.

Growing use of compacts throughout country, meanwhile, threatens to cut deeply into growth of the gasoline market.

Special Journal survey (p. 75)* reveals petroleum marketers expect the compacts to cost the industry 200,000 bbl. daily of gas sales by 1965.

▼ ▼ ▼

Cut in oil's percentage depletion will come sometime during the Kennedy tenure, Republican Senator Williams of Delaware predicts in an exclusive interview (p. 78).

Williams, the most effective opponent of depletion allowance, says his stand is based on belief the rate is unfair. He adds that the harder the industry fights a cut the deeper it will be.

Democrats soon will have a majority on the FPC.

President Kennedy has named two Democrats, Joseph C. Swidler and Howard Morgan, to the commission and will have a chance to name a third in June when term of Arthur Kline expires (p. 80).

In separate interviews, both Swidler and Morgan indicated they are consumer oriented but professed concern that a healthy gas industry should be maintained.

Other Washington talk: Hope for gas legislation this year is fading. Industry group decided in New York last week not to stage aggressive fight now...Look for fuels study proposal to move quickly through Senate...Don't attach too much importance to House expansion

---

*Refers to article in this issue giving more details. When no page is given, the item is a Newsletter exclusive.

of Rules Committee. Vote was so close administration will move with caution to avoid floor fights...Hike in residual-fuel quotas before current quarter is possible. Interior officials are keeping a close watch over situation on the East Coast.

▼ ▼ ▼

Good gains in profits are being shown for 1960 in reports of the major oil companies now being released. A few marked up record business for the year in spite of unfavorable industry trends.

The early reports: Jersey Standard $688 million up from $630 million in 1959; Texaco $391.7 million up from $354.3 million; California Standard $266 million up from $253 million; Shell $144.5 million down from $147.4 million; Phillips $112.4 million up from $104.4 million; Continental $61.2 million up from $60.3 million; Sinclair $52.4 million up from $45 million; Sun $49.3 million up from $42.8 million; Ohio $39.2 million up from $38.6; Union $34.4 million up from $27 million; Atlantic $46.5 million up from $30.1 million.

Mergers and sales: Pan American is selling its Bastian Bay holdings to Tennessee Gas Transmission for $159 million—6% in cash and the rest payable over 17 years. Reserves will be recalculated after 5 to 7 years and sale price adjusted (p. 86)...Delhi-Taylor move to absorb Three States Natural Gas in stock-exchange deal has cleared all major stumbling blocks (p. 88).

Major underground gas storage project in southwestern Ontario is being studied by Imperial Oil, a producer in this oldest gas-producing area of Canada.

The plan: Depleted fields would be used to store Alberta gas, pumped through Trans-Canada Pipe Lines in the summer, for use in eastern markets in the winter.

▼ ▼ ▼

Good stastical case for crude-price increase is being made by IPAA President Alvin C. Hope. His figures once again underscore the squeeze in which producers find themselves.

The trends: Crude since 1957 has averaged a 17-cent per barrel decline. Wages alone have gone up about 11 cents per barrel. Thus the producer should have a 28-cent per barrel increase just to catch up on these items alone.

Other costs, however, also have risen. Casing is up 8% over the last 4 years, machinery and line pipe up 3%. Add to this the effects of restricted production.

Notes on crude: Slight increase is posted by Great Northern for some Saskatchewan crudes. New price on Weyburn is $1.80 per barrel, up 2 cents; Midale A $1.81, up 2 cents; and Midale C $1.70, up 1 cent...Oklahoma and New Mexico February allowables are unchanged, Kansas is up slightly. Oklahoma minimum is 17 bbl. daily per well which will produce 520,000 bbl. daily. New Mexico kept 35

bbl. per day for southeastern fields and 70 bbl. daily for San Juan basin. Kansas set output at 315,000 bbl. daily, a 5,000-bbl. daily gain...

▼ ▼ ▼

Use of contract scouting in the tristate area of Illinois, Indiana, and Kentucky is under discussion.

Several companies now participating in the scout check at Evansville plan a meeting this week to study the possibilities.

Lease prices are zooming in the two-state Sherman-Marietta basin on the basis of the biggest, richest, gas strike in North Texas and a twin discovery across the border in Oklahoma.

The North Texas field is New Mag Oil Creek in Grayson County. Its Oklahoma twin is Southeast Marietta. The two lush gas-condensate fields suggest the possibility of a chain of similar pools in the deep central portion of the basin (p. 82).

Wildcats worth noting: Two remote Nebraska tests may open new producing counties near significant Redwillow County Cambridge arch play. Good shows in the Lansing-Kansas City were encountered at Strata Oil 1 Neiman in Frontier County and W. E. Wickizer 1 Thompson in Harlan County...Texaco will drill 15 miles south of Buffalo field in South Dakota, the first new well in the state for several months. Target will be the Ordovician in an undrilled area of the Williston basin...Montana has three important wildcats coming up. One will go to Devonian in Daniels County, spurred by Tule Creek activity. Two others are a Mississippian test in Sheridan County and a Morrison well in Powder River County...Georgia again defies the oil explorers. Humble's Seminole Lake test has resulted in a 4,500-ft. dry hole...A string of five giant gas strikes was completed in South Texas last week—an outstanding performance which enhances the outlook of that sprawling region as a rich gas storehouse (p. 97).

Louisiana's next lease sale has been changed from May 18 to April 20. Deadline for accepting applications for tracts is March 10. Sale covers inland and Zone 1 offshore acreage. Change was made so current legislature could appropriate the income.

Octanes of the nation's gasoline remained steady in January.

Ethyl Corp. survey shows research octane of premium remained unchanged from December and a year ago at 99.3. Regular averaged 92.6, unchanged from December but 0.3 number above a year ago.

Look for more farmouts of research projects to college labs.

Economy dictates the move—use of students is cheaper.

Speed and versatility also favor it. Much of the preliminary detail on many studies by oil companies can be easily farmed out to free top scientists for tougher problems. The plan also may adapt itself particularly to fundamental research programs.

One major oil company planning to go this route says colleges are eager to cooperate, have talent available at reasonable cost.

Market Memo

Feb. 6, 1961

Three trends currently dominate petroleum markets:
...Continued brisk demand and firm prices for light fuels.
...Uneasy quietness for gasoline.
...All-time record average daily refinery runs.

Kerosine prices advanced one-fourth cent to 10 cents per gallon on the Gulf Coast. The increase was partly a reaction to the jump a week earlier in No. 2 and partly the result of good demand, especially in the Southeast.

No. 2 remained in a firm price position with supplies still on the tight side in nearly all areas.

The market is cleaned out for spot sales through February. Two cargoes are reported uncommitted for March. One of these probably would be available if the buyer also would take some gasoline.

Size of the big movement of No. 2 into the East Coast now can be charted. It explains the near sold-out conditions on the Gulf. About 20 cargoes were sold in the last 2 weeks with all independent refiners from New Orleans to Corpus Christi participating. Another 700,000 bbl. came down river.

The river movement has been snarled by ice at Alton. Some of the No. 2 already sold may be slow moving to the Gulf. Going prices ranged from ⅛ to ⅜ off Gulf low at lifting point. Some buyers reportedly were willing to pay Gulf low at midriver points, but the supply is tight. There also are no distress Mid-Continent supplies.

East Coast distillate markets also tightened up. Talk of one more price increase was heard in some parts, but there is considerable doubt on this score. Although distillate demand last week hit the season's high of 3,320,000 bbl. daily, feeling of many marketers is that the calendar is against another price increase.

The future for gasoline provokes two schools of thought.

Some on the Gulf feel refiners want to hold the price line and have enough clean storage to keep gasoline until seasonal demand picks up. Others feel interrefinery buying will be needed to ease some tight spots. Gasoline demand is slow not only on the Gulf but also on the river and in the Mid-Continent. Mobil and Esso cut out two depressed gasoline areas with price raises in upstate New York and North Carolina. California marketers are happy over going a year without a major price war.

Refinery runs, which have been moving steadily higher for last few weeks, finally topped record with 8,401,000 bbl. daily last week. Previous record was 8,396,000 bbl. daily last January.

The runs, however, did not produce any records in individual products. They did add 5,187,000 bbl. to gasoline stocks, now nearly 7 million barrels higher than last year.

Dial "S" for service

It can get pretty lonely around 2 a.m. The cleaners and charwomen have gone home. There's only one light on in the whole building.

Suddenly, the phone rings. Somewhere a refinery man needs expert technical assistance, somewhere there is a catalyst emergency that couldn't wait to happen. A pleasant voice in the night asks, "I have a collect call from Texas for SAratoga 7-3912, sir. Will you accept charges?"

Sure you will.

Why should Davison keep a telephone open, why should Davison keep a Technical Service Engineer on call day and night, seven days a week . . . just to answer service questions or provide catalyst in a hurry?

Because that's what "Service" means to Davison. Expert technical assistance whenever . . . or wherever it is needed.

If you have an emergency catalyst problem or want facts about catalysts . . . dial "S" the 24-hour service phone number (SAratoga 7-3912, Baltimore, Maryland.)

GRACE

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Dig up to 800 feet of trench an hour—6 to 12 inches wide, as deep as 6 feet—with International 340 and ladder-type trencher.

For toughest digging, as deep as 13¼ feet, team the International 460 with heavy-duty No. 95 backhoe.

For general purpose trenching to 10-foot depth the International 340 tractor and No. 65 backhoe offer outstanding value.

Fast, clean, low-cost trenching!

with International tractor stamina and economy

High capacity and on-the-job dependability are the true measures of low-cost digging and trenching. You get them *both* in the highest degree with International® 340 and 460 Industrial tractors. These rugged Internationals have the built-in strength and balance to let the operator crowd the backhoe bucket for full loads . . . even in the toughest kind of digging . . . and the *stamina* to stand up in heavy-duty service long after more lightly built units have "had it."

Keep costs down—match tractor size to your range of jobs. The husky International 340 is a four-cylinder tractor—gasoline or Diesel—for 10 or 12½-foot backhoes and 1,600-pound loader capacity. The mighty International 460 is powered by six-cylinder, Multi-Range gasoline or Diesel engine. It has the power and weight balance for 12½ or 13¼-foot backhoes—lifts up to 2,500 pounds with front end loader.

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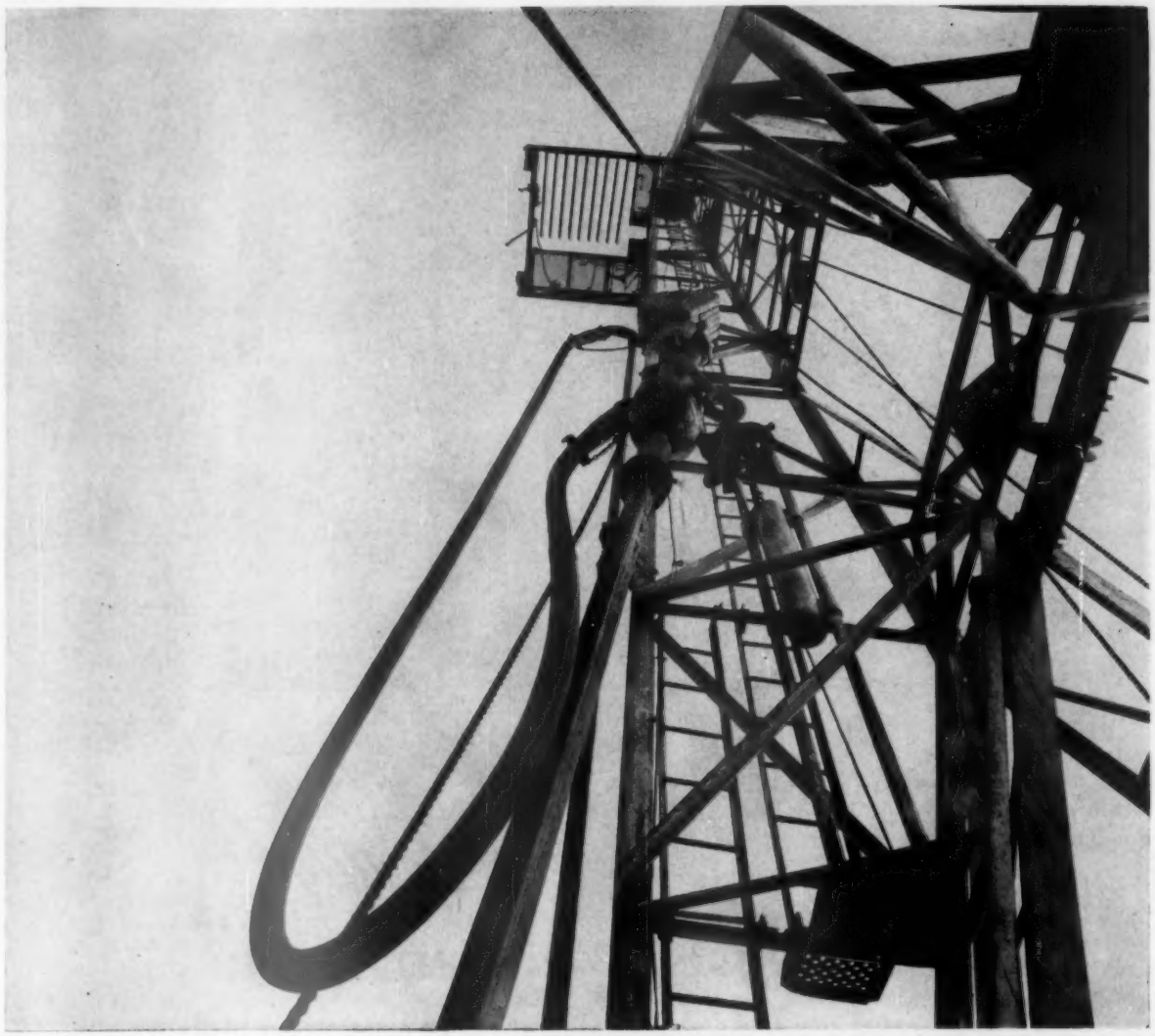
INTERNATIONAL HARVESTER



2½ years, 200,000 feet drilled with B.F.Goodrich hose on the rig

THAT B.F.Goodrich rotary drilling hose has paid for itself and has given its owner a 50% bonus in service. Previous hose used on this rig gave out after just a year. But B.F.Goodrich hose, after 2½ years in which the rig drilled a total of 200,000 feet, was still going strong. And there hadn't been a minute of downtime for hose maintenance.

Here's why. B.F.Goodrich Highflex hose has a thick, tough cover that can take plenty of abuse. It resists banging, gouges, scrapes and tears. Weather doesn't weaken it. Oily mud doesn't cause swelling or rotting of the tube.

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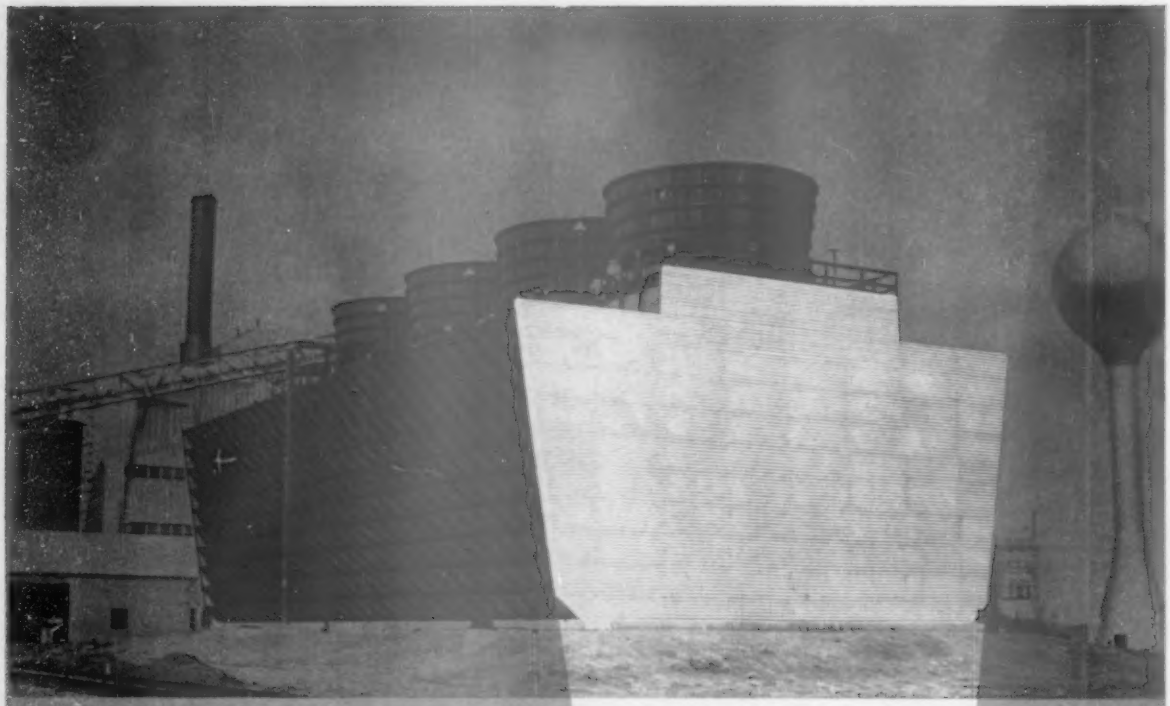
Strong as it is, B.F.Goodrich Highflex is also the most flexible hose made for heavy duty service. It's easy to attach to the rig, hangs well from the standpipe, coils easily without kinking.

You'll find B.F.Goodrich Highflex hose at leading supply stores in the oil field, or at any of these B.F.Goodrich warehouses: Los Angeles, Great Bend, New Orleans, Shreveport, Hobbs, Oklahoma City, Tulsa, Corpus Christi, Dallas, Houston, Kilgore, Odessa, Wichita Falls. *B.F.Goodrich Industrial Products Company, Dept. M-945, Akron 18, Ohio.*

B.F.Goodrich

ROTARY DRILL HOSE



Contour of Quality!

In a Marley Class 600 Double-Flow tower, predetermined performance is as characteristic as its functionally angled profile. This new 30,000-g.p.m. tower is typical of a long list of *successfully tested* Class 600's that demonstrate why their contour is now accepted as the symbol of ability to meet or exceed specified cooling capability. Each year the list of these plus performance installations grows; each year the test list and test results are published as a public record.

The Class 600 contour also signifies other important design advantages: One of the most outstanding of these is the excellent balance of air volume and air velocity that permits largest capacity per fan cell. The end result is low required horsepower; less mechanical equipment; reduced maintenance cost. Further, the distinctive shape points up a high standard of durability established by liberal use of non-corrosive materials at critical points throughout Class 600 structure.

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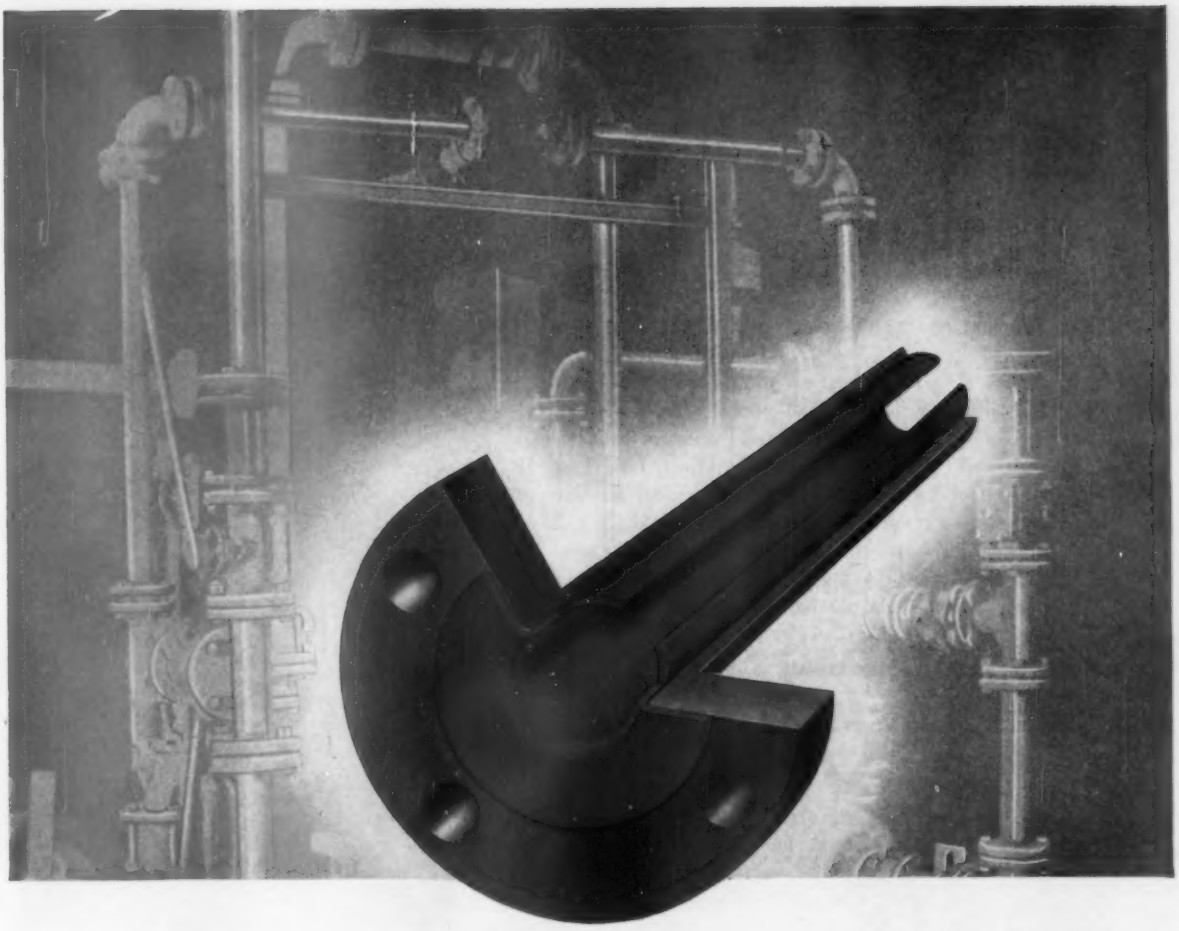
THE MARLEY COMPANY ● KANSAS CITY MISSOURI



Plant saves $60,000 per month by switch to pipe lined with TEFLON®

In a plant manufacturing a chemical intermediate, excessive maintenance costs and product losses ran as high as $60,000 per month. Such frequent failures occurred in the process involving corrosives at high temperatures and pressures, that onstream time averaged only 75% during the first six months of operation. After a period of testing, more than 1500 feet of pipe lined with Du Pont TEFLON TFE-fluorocarbon resin were installed. Result: No failures of lined pipe occurred in over 2 years of service.

TEFLON TFE resins are unaffected by HCl liquid and vapors, fuming nitric acid—white or red—hydrofluoric acid, organic solvents and reagents. TFE resins are rated for use up to 500°F. Their non-adhesive surfaces prevent plugging by high-viscosity materials. TFE resins do not shatter under vibration, thermal or physical shock.

The liner flared over the flanges provides protection for the steel from the process fluid and eliminates the need for additional gasketing. Installation costs are further reduced because the pipe is equipped with standard flanged fittings which are easily connected. And the need for careful aligning, hanging, welding and other special procedures is eliminated.

In your petrochemical processes, you can insure long service life and greatly reduced maintenance and downtime by installing pipe lined with TEFLON TFE resins. For more details on properties and performance send for the new bulletin on Lined Pipe . . . and for more general information, ask for the fact-filled booklet, "Designing with TEFLON". Write to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department OG-26, Room 2526T, Nemours Building, Wilmington 98, Del. **In Canada:** Du Pont of Canada Limited, P. O. Box 660, Montreal, Quebec

DU PONT TEFLON® FLUOROCARBON RESINS

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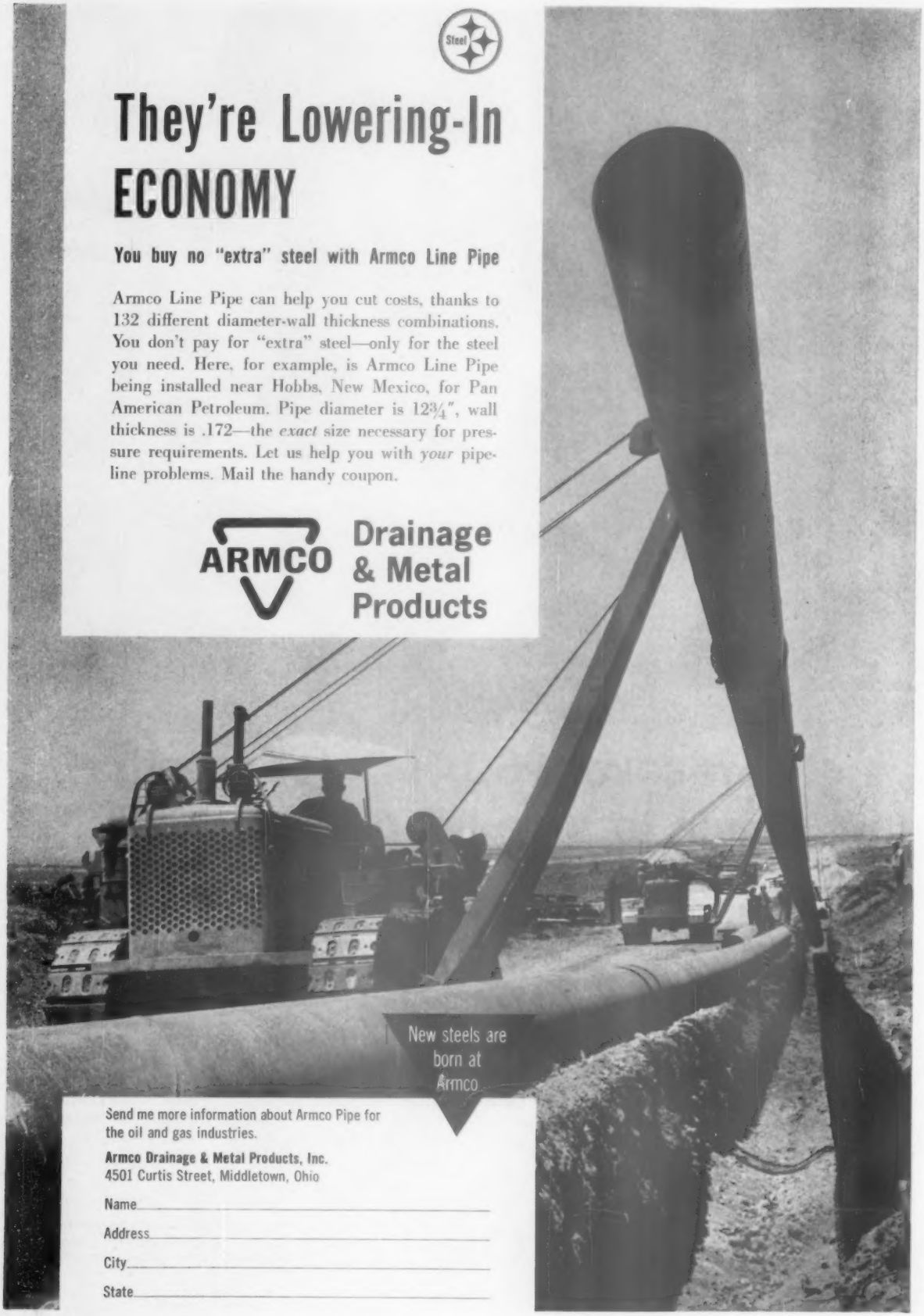
They're Lowering-In ECONOMY

You buy no "extra" steel with Armco Line Pipe

Armco Line Pipe can help you cut costs, thanks to 132 different diameter-wall thickness combinations. You don't pay for "extra" steel—only for the steel you need. Here, for example, is Armco Line Pipe being installed near Hobbs, New Mexico, for Pan American Petroleum. Pipe diameter is 12¾", wall thickness is .172—the *exact* size necessary for pressure requirements. Let us help you with *your* pipeline problems. Mail the handy coupon.

ARMCO **Drainage & Metal Products**



Send me more information about Armco Pipe for the oil and gas industries.

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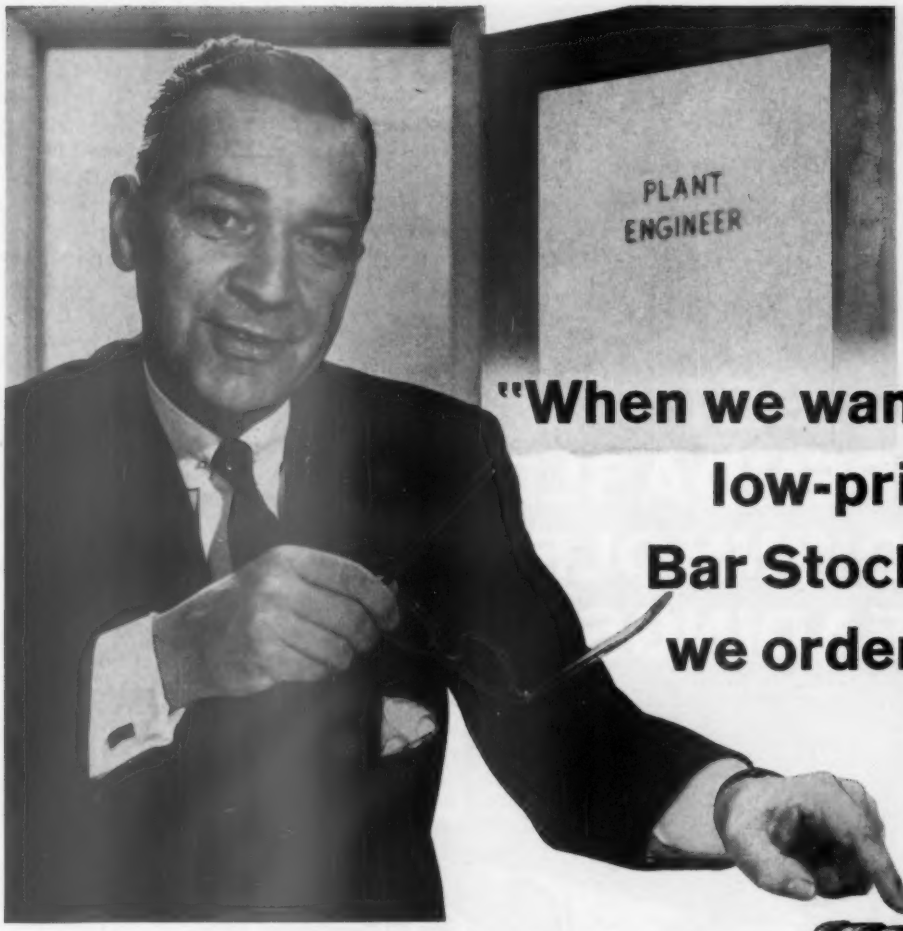

"When we want rugged, low-priced Bar Stock Valves we order R-P&C"

"For a really versatile, **all-purpose** valve, we've found there's none better than R-P&C bar stock valves. Designed and built **for close control service,** the construction of these valves makes them well suited to many general purpose applications as well. For example, the **compactness** of R-P&C bar stock valves is particularly advantageous for close-coupled installations in instrument lines or on panel boards and for pressures up to 10,000 lbs. in steel."

These valves are available in a wide variety of materials to withstand extremely high temperatures and pressures. But best of all, R-P&C bar stock valves are economically priced. This is made possible through special techniques developed by R-P&C.

We highly recommend R-P&C bar stock valves for meter, gauge, sampling, or test valves on equipment requiring a reliable compact valve that can withstand high pressure service.

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R-P&C VALVES

ACCO

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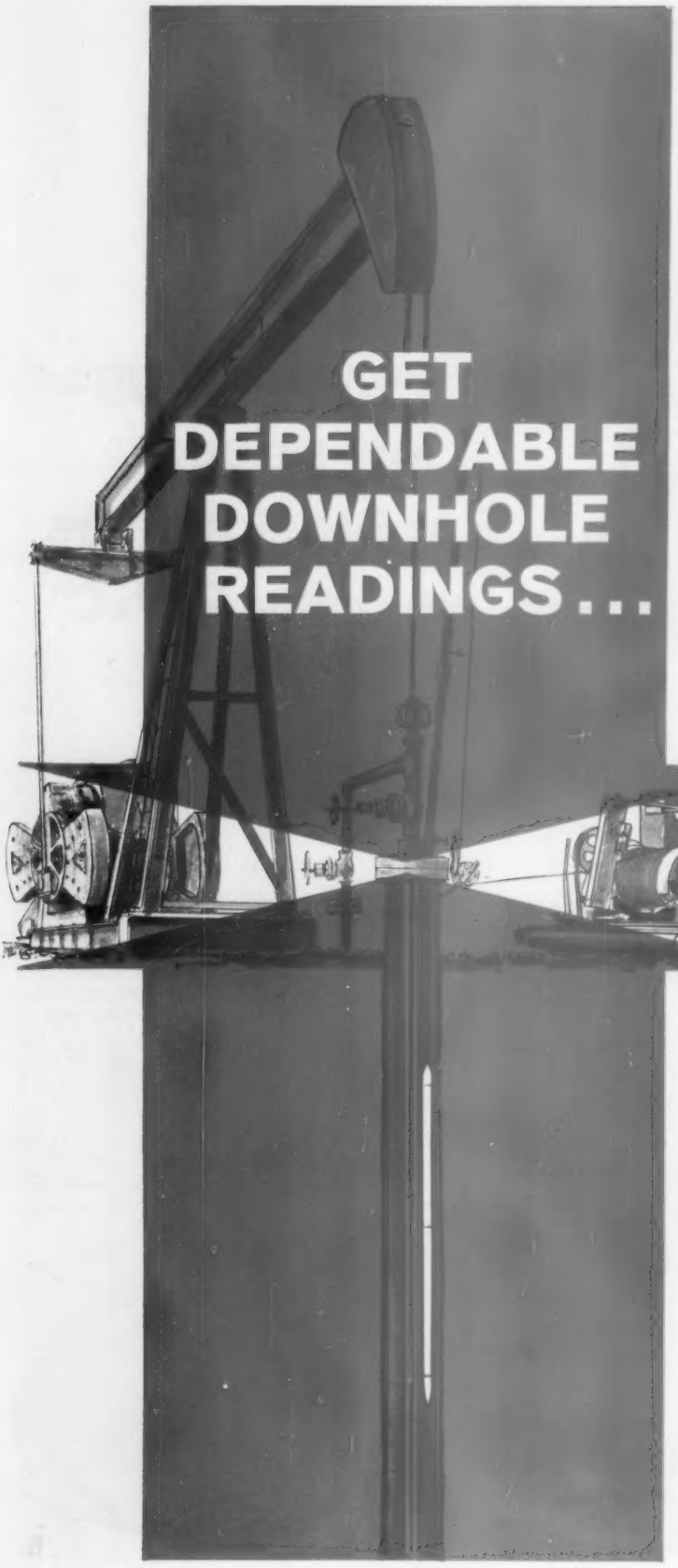


GET DEPENDABLE DOWNHOLE READINGS... *without pulling the pump*

A major oil company had a reservoir engineering problem. Downhole temperature and pressure readings of a pumping lease were needed to help determine required production stimulation and/or pumping rate modifications to maintain the best production rate from the field.

Facing the task of pulling the pump from each well to obtain this data, the producer asked Halliburton to design a Measuring Reel with which they could run bottom hole instruments in the annular space between tubing and casing without fouling the instruments down hole.

The answer was the Halliburton Fluid-Drive Reel Measuring Assembly, with a built-in torque cushion. This gives advance indication of hanging the line and reduces the hazard of pulling it in two when the tool or instrument wraps around the tubing or hangs up when coming out of the cased well or open hole.

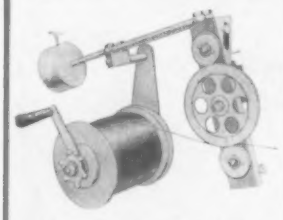
HERE'S HOW IT WORKS

The Hydraulic Fluid-Drive Reel Assembly is driven by a hydraulic motor, powered from an engine-driven pump. A fluid by-pass, running parallel to the hydraulic system, incorporates a needle valve which may be preset to a specific shut-down pressure. If excessive loading of the wire line occurs, such as when the line wraps around tubing, the needle valve causes the pump to stall out and act as a hydraulic brake on the driving motor. This unique system gives a more accurate control of the speed and line pull of the measuring line reel going in and coming out of the well. Design flexibility of the Fluid-Drive Measuring Assembly provides for a completely packaged unit powered by gas/gasoline or diesel engines, as well as electric or air motors. Standard reel capacities include 24,000′ of .066″; 20,000′ of .072″; 17,000′ of .082″; 14,000′ of .092″ regular measuring line; or 4,900′ of 9/64″ cable or well shooter line.

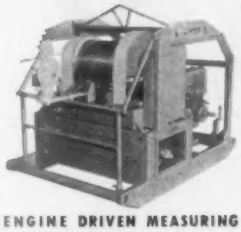
BETTER MEASURING EQUIPMENT
for demanding jobs, such as . . .

- Measuring Top of Cement
- Cable Tool Depth Measure
- Hole Deviation Tests During Drilling
- Reservoir Engineering
- Swabbing and Sand Washing
- Pulling Chokes and Gas Lift Valves
- Dual Zone Rework

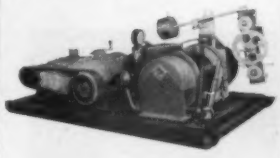
HALLIBURTON MEASURING ASSEMBLIES



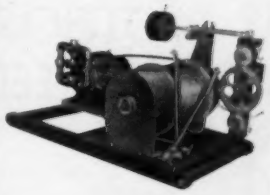
STANDARD MEASURING DEVICE for manual or cathead operation. Available in model shown, or in Heavy Duty type with hand brake.



ENGINE DRIVEN MEASURING ASSEMBLIES are available with diesel and gas/gasoline power in several sizes for light to severe wire line operation.



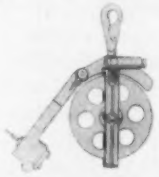
ELECTRIC MOTOR DRIVEN MEASURING ASSEMBLIES for use where electric power is the most practical application.



AIR MOTOR DRIVEN MEASURING ASSEMBLIES for pneumatic operation off rig air supply.

A FULL LINE OF ACCESSORIES

UNMATCHED MOBILITY can be provided any Halliburton Measuring Assembly with this light, two wheel, metal covered trailer.



LATCH TYPE HAY PULLEY AND LINE WIPER efficiently guides the line into the hole, automatically wiping it free of foreign particles which might damage the line or stuffing box.

STUFFING BOX AND STAFF ASSEMBLY available in models for working pressure of up to 5,000 psi and 15,000 psi.

MEASURING LINES are available in lengths up to 25,000′ in economical Regular Type Black, Galvanized Steel, Nickelply and Stainless Steel. Standard diameters are .066″, .072″, .082″, and .092″.

REPAIR PARTS AND SERVICE are immediately available through all Halliburton Field Locations.

Contact your Halliburton Representative for full details on a Halliburton Measuring Assembly. It can be tailored to your exact needs.

MEASURING EQUIPMENT

275 Service Centers . . . just minutes away from your well!

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'Hunt' a Better Deal in Oil Banking!

Not even this business crest can show all the facets of Executive Vice President Russell F. Hunt's career. From law to oil and industry; from Cumberland U. to the Tulsa Chamber of Commerce; from busy colonel to banking and currency; his is a background rich in both public and private affairs. And thanks to his personal experience in the industry, Russell Hunt knows oil men's problems! If you're hunting for the best in oil banking, from one of the most able and experienced oil departments in America (with one of the nation's largest oil-credit files), just . . .

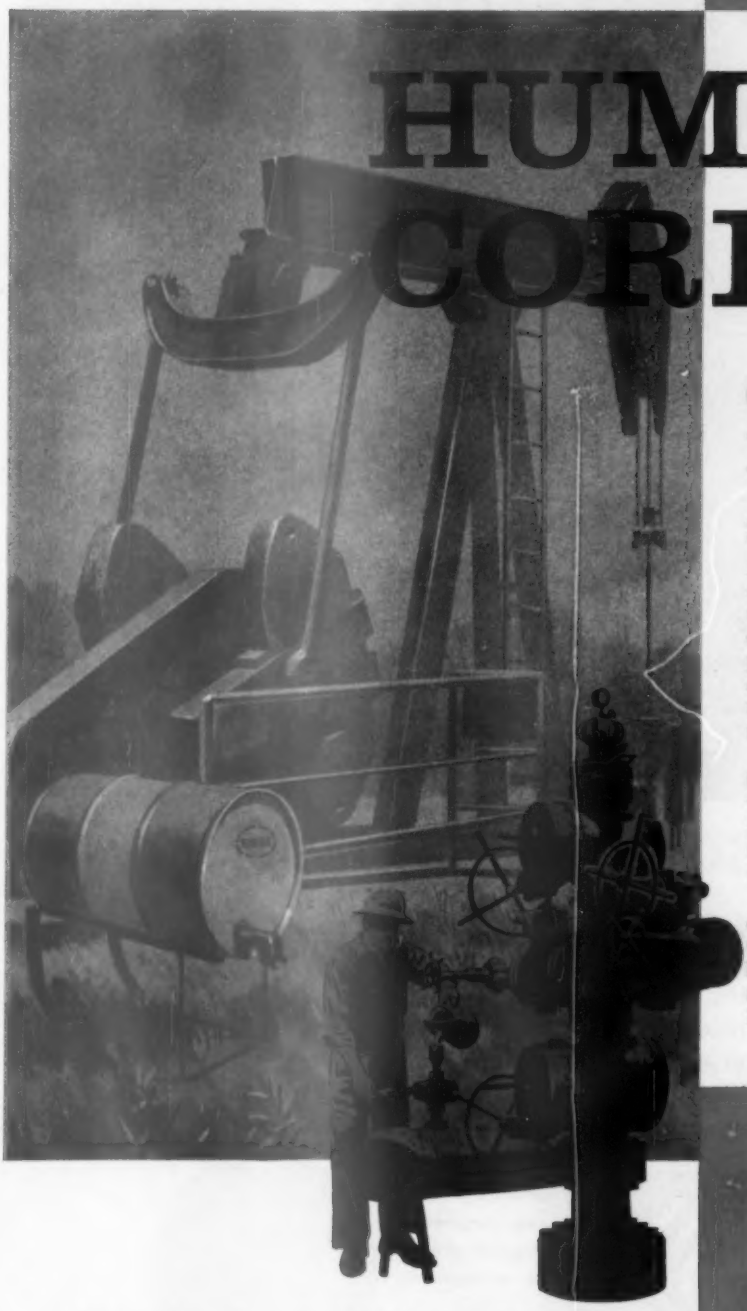
Think... 1st of Tulsa SINCE 1895

FIRST NATIONAL BANK AND TRUST COMPANY

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

Before Corexit: As many as 16 rod jobs on 9 wells in 1 month

After Corexit: Only 4 rod jobs in any 1 year!*



HUMBLE COREXIT®

CORROSION INHIBITORS

* *COREXIT saves $1,010 per well per year* in one field . . . $780 per well in another . . . has proved highly profitable in thousands of wells. In both sour and sweet crude fields, COREXIT corrosion inhibitors prolong life of sub-surface equipment, reduce well-pulling jobs and prevent production losses . . . usually through simple batch treatment.

In deep high pressure, high bottom-hole temperature wells, *squeeze treatment* with COREXIT is opening new opportunities for economical corrosion control. Only a few treatments per year are usually required.

Find out how COREXIT can cut your costs. Call your Humble Salesman, or contact Humble Oil & Refining Company, Houston, Texas. COREXIT is available for immediate delivery from Humble Bulk Plants and other marketers.

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America's Leading ENergy COmpany

Silent Watchman . . .

Providing around the clock dependability for this clean, modern refinery is the presence of utility electric power. In all phases of operation it holds costs down and also brings greater convenience and the advantages of automatic control. Utility electric power not only provides high continuity of service vital in refinery operation, but it also is so adaptable for individual or special requirements and yet flexible enough for many unforeseen requirements. Call your nearest Utility Electric Power Company today for complete details.

Petroleum Electric Power Association
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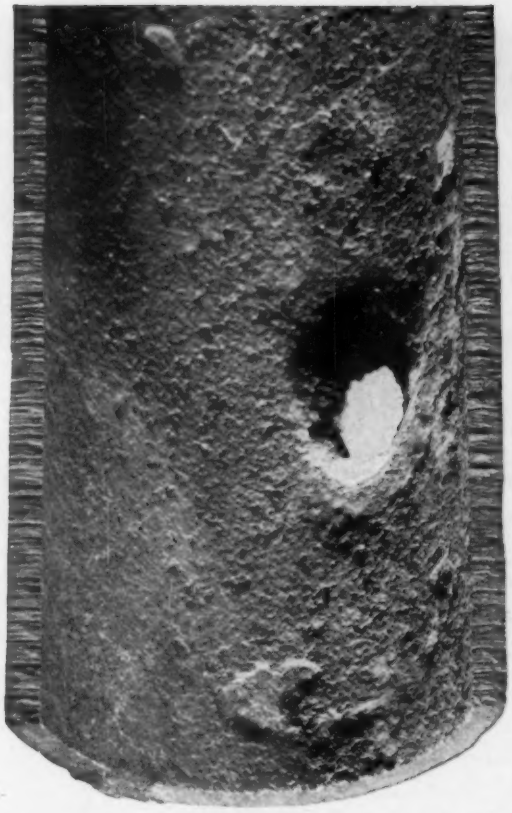
Utility Electric Power saves money, manpower, maintenance and serves you better automatically

A list of P.E.P.A. members will be furnished on request.



Sulfate reducing bacteria, cause of corrosion that penetrated this brine line, can now be controlled. New Visco Formulas prevent this attack, in brine, as effectively as in fresh water systems.

In Waterflooding: Strict Control of Sulfate-reducing and Sulfide-producing Bacteria In Brine as well as Fresh Water Systems.

STOPS ➤ **Pitting Corrosion**
Iron Sulfide Sludge Formation

Controlling sulfate-reducing and sulfide-producing bacteria in fresh or brine water injection systems is an integral part of Visco treatment for waterflooding . . . along with efficient clarification, scale prevention and corrosion control.

Effective, *economical* control of sulfate-reducing *and sulfide-producing* bacteria in waters of high chloride content is a new development in water treatment practice . . . one you should certainly investigate if control costs are running high—or effectiveness is less than excellent

Write or call for action today.

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Incorporated
A Unit of Nalco Chemical Company
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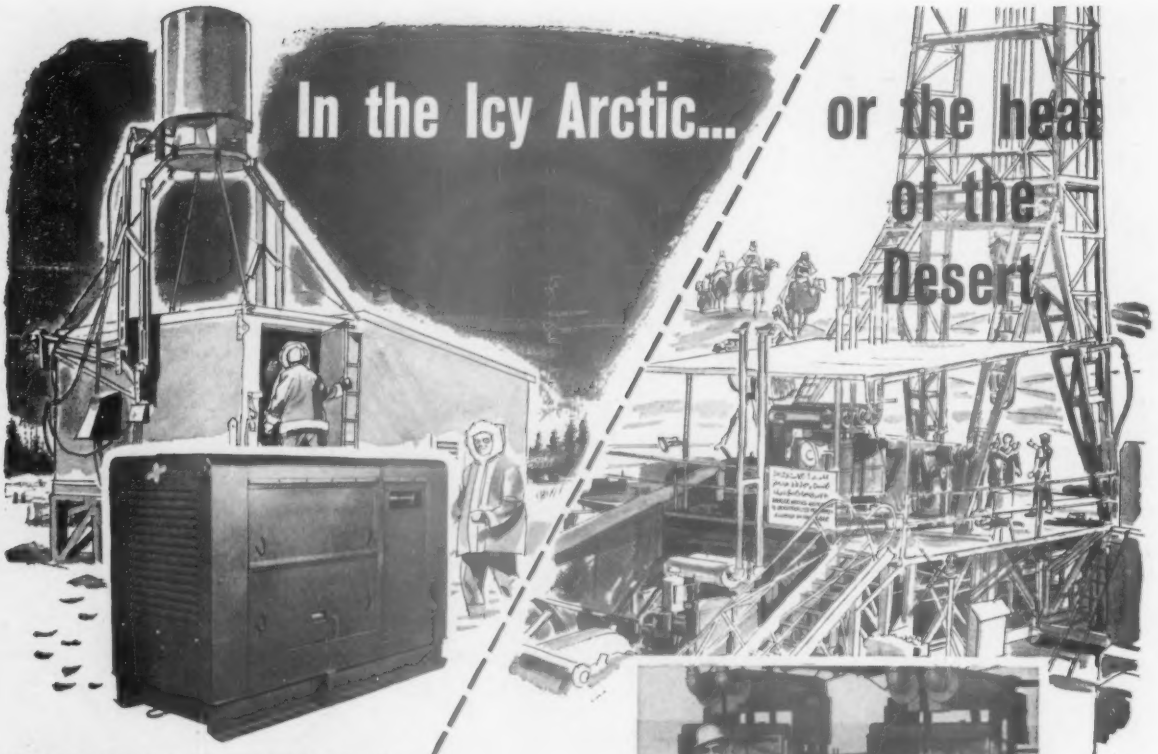

Model MB-2 Stewart & Stevenson 30 KW Diesel Generator Set generating power around the clock. The unit provides electric power for operation of electronic apparatus vital to human safety and communications in the Arctic.

Parker Drilling Company rig, powered with GM Model 12103 Diesel Engines. Lighting and auxiliary power are supplied by a Stewart & Stevenson oilfield Utility Unit and Rig Lighting Plant. The engines were properly equipped and modified by Stewart & Stevenson with special cooling and air intake systems.

STEWART & STEVENSON

When it comes to diesel or gas engine power, Stewart & Stevenson experience and "know-how" have no boundaries.

Here again are two diesel engine power applications . . . in direct contrast and in opposite parts of the world . . . with one important characteristic in common: both were designed and built by Stewart & Stevenson Services, the world's largest distributor of diesel engines. Both power applications are serving vital industries where thousands of dollars and valuable contracts are totally dependent on the reliability and performance of this engine driven equipment.

When you need power . . . for any application in any part of the world . . . Stewart & Stevenson's experience, service organization and engineering will guarantee dependable performance. We will be glad to study your power needs and submit recommendations. Please write for additional information.

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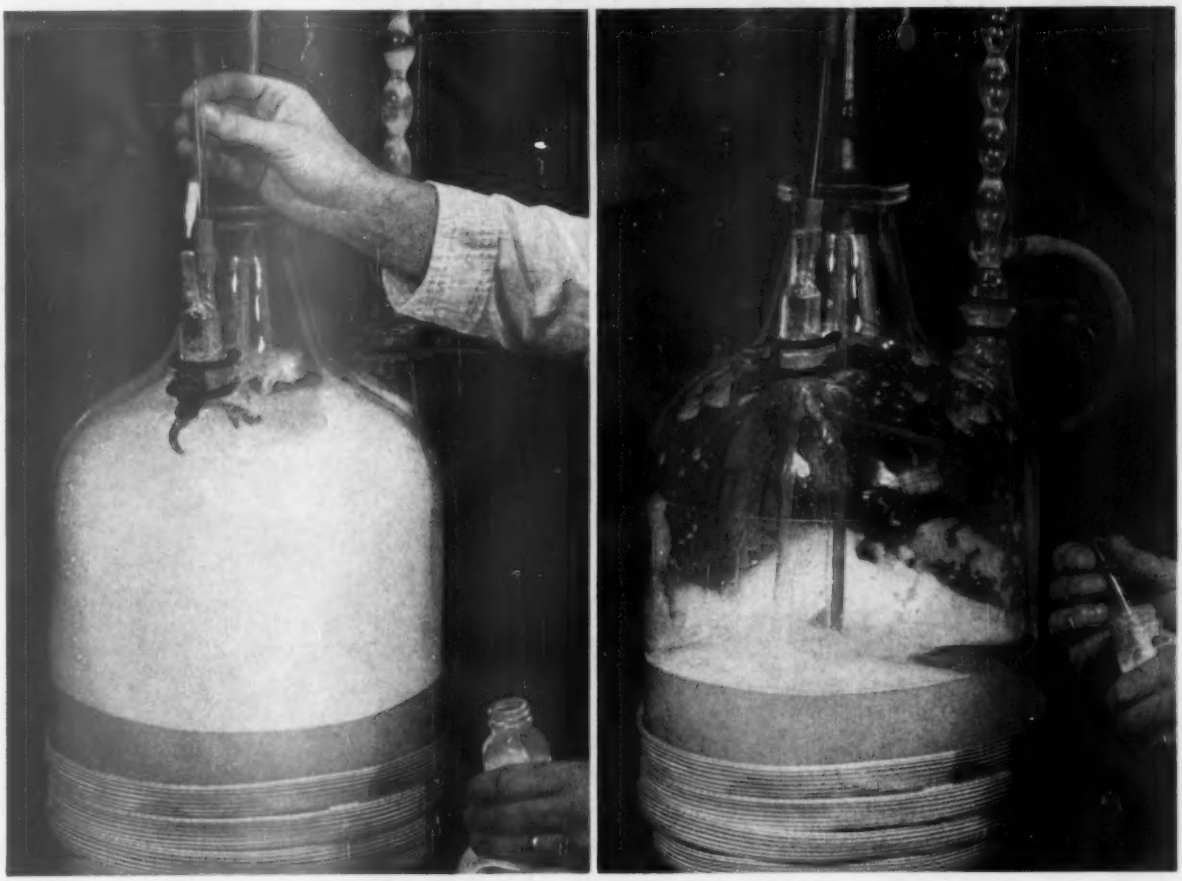
SILICONE NEWS from Dow Corning

See How Foam Robs You



Silicones stop foam; help you operate at maximum capacity

Why accept foam as a necessary evil, when you can control it effectively and economically with Dow Corning Silicones? Amazingly effective in trace quantities, these silicone antifoamers enable you to utilize capacity now taken up by foam . . . help speed processing . . . prevent spill-overs . . . reduce fire hazards . . . cut maintenance costs.

Serving Every Industry. Dow Corning job-proved silicone defoamers and antifoamers neither alter nor adulterate products or processes. And they're effective against even the most violent and persistent foamers. Typical applications include processing of adhesives, chemicals, petroleum, asphalt, paper, paints, textile and drugs; also useful in metalworking and laboratory work. In food processing, the use of food grade Dow Corning antifoamers at designated levels is sanctioned by FDA.

Easy to Use. You don't need extra equipment or preparation time when you use Dow Corning Silicones to control foam. Our product development group has formulated different types to be most adaptable to different systems . . . to help you rid your process or product of foam problems effectively, economically.

Free Sample. Here's your chance to see how Dow Corning Silicones can work for you. Tell us your foam problem and type of system—oil, aqueous, nonaqueous, food product or other. A generous trial sample of the silicone defoamer most suitable for your process will be sent by return mail. Write Dept. 6214.

"ABC's of Defoaming" — new 8-page brochure gives full data. Write today for free copy. Address Dept. 6214.

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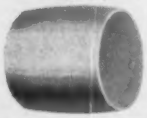
When selecting roller bearing pillow blocks, remember

it's what's inside that counts!

MAXIMUM SIZE AND NUMBER OF ROLLERS for highest capacity



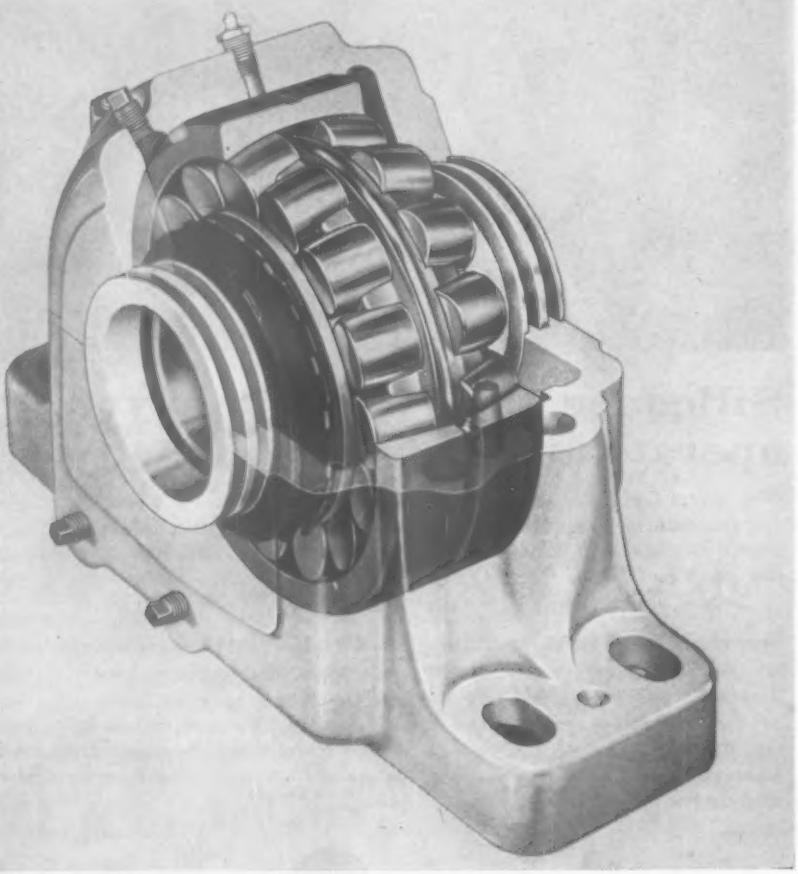
CENTRIFUGALLY CAST, PRECISION MACHINED BRONZE RETAINERS for smooth, quiet operation

HIGH, HEAVY INNER RING FLANGES for ease of installation and removal

AND INSIDE LINK-BELT ROLLER BEARING BLOCKS you'll find Link-Belt's new spherical roller bearings . . . with big, mirror-smooth, highest capacity rollers; centrifugally cast, precision machined bronze retainers; heavy, broad-shouldered inner rings. *All* the best features of modern bearing design compactly unitized for utmost economy and long service life.

Link-Belt spherical roller bearing pillow blocks are self-aligning. Available in adapter mounting and direct-shaft mounting types for shafts from 1 7/16" to 12". Choice of two effective seals: all-purpose steel, multi-labyrinth seals, or Dacron-contact seals.

For full details, call your nearest Link-Belt office or authorized stock-carrying distributor. Look under BEARINGS in the yellow pages of your telephone directory. Ask for Book 2760.



SERIES 6800, 6900, 7800, 7900 have exceptionally rugged, two piece housings—machined as two perfectly matched parts providing easy installation.

LINK-BELT

SELF-ALIGNING BALL AND ROLLER BEARINGS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 26, Odessa, Tex., New Orleans 16, Shreveport, La., Los Angeles 22 (Montebello), Scarboro (Toronto 13); Export Office, New York 7. Distributors in all Fields. 15,414-B

TANK CARS WITH A BONUS

When these familiar yellow and green Du Pont tank cars are spotted at your blending plant, the bonus they represent in technical, training and marketing services can be as valuable to *you* as the tetraethyl lead itself is to your gasolines.

These services are available to you, a Du Pont TEL customer, as aids in your planning and operations —from blending plant to consumer. They include:

At the refinery, our technical staff can assist you in blending plant design and construction, in continuous gasoline blending operations and linear programming, for example. They can also offer road octane survey data plus blending improvement know-how through Du Pont's petroleum additives research.

Training aids for Du Pont TEL customers include programs for blending plant personnel, lead hazard clinics plus visual aid and related materials to supplement your own training programs on the safe handling of tetraethyl lead.

Marketing data include surveys on why motorists buy certain brands, how service station operators can turn customers' car worries into sales advantages, plus many other facts. Fuel and lubricant specialists are also ready to help you sell fleet customers.

For more information on this bonus of service, contact your nearest Du Pont representative, or write to: E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Division, Wilmington 98, Delaware.

DU PONT
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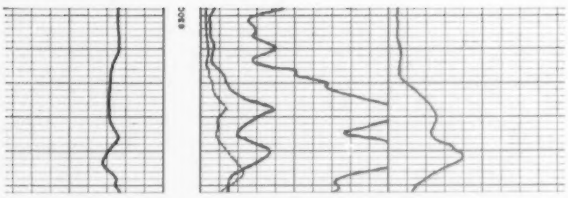
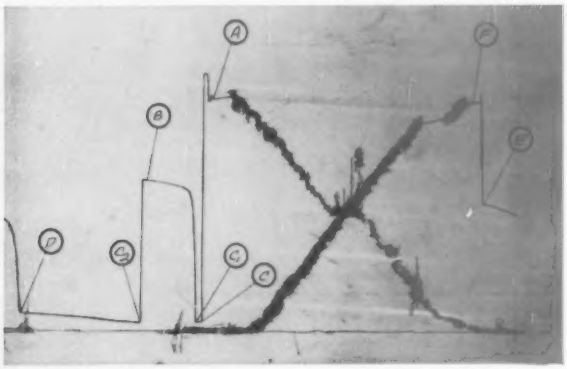
Better Things for Better Living
. . . through Chemistry

Lead Antiknock Compounds *and other* PETROLEUM ADDITIVES

WHICH WELL WAS THE PRODUCER?

WELL "A"

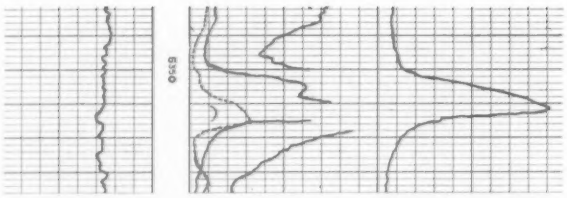


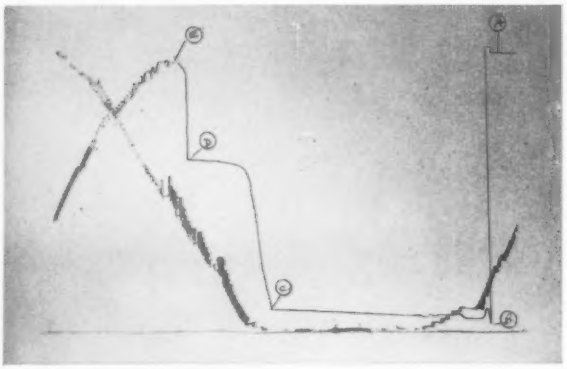


Electric logs on well "A" indicated fair to good permeability. Resistivity was indicative of fluid content. Cuttings showed a good oil stain on the interval *6312—6357*. Core analysis and log interpretation left considerable doubt as to whether the zone would be commercially productive. The section showed a good percentage of porosity, fair permeability and 10.6% oil/46.5% water content. To supplement existing data, Johnston Testers performed a three-hour Selective Zone Test on the sand and recovered 125 feet of oil and 700 feet of water.

Casing was set on the well and the zone perforated. The sand was acidized to stimulate production and improve oil/water ratio. Was this well a commercial producer?

WELL "B"





A slight oil show was noticed in cuttings from the sand at interval *5350—5370* shown on the above log. Logs which were run indicated low permeability at this interval. Core analysis verified the low permeability but showed a rather high percentage of porosity and 18.2% oil/36.5% water content. To supplement this data, Johnston Testers performed a four-hour Selective Zone Test and recovered 370 feet of oil and 180 feet of gas cut mud and water.

Casing was set and the zone perforated. The sand was treated to improve the flow characteristics and improve the oil/water ratio. Was this well a commercial producer?

Above Drill Stem Test information, test data and the fluid recovery, indicated a non-commercial producer on Well "A." Subsequent acidizing result was poor. The well was abandoned and plugged.

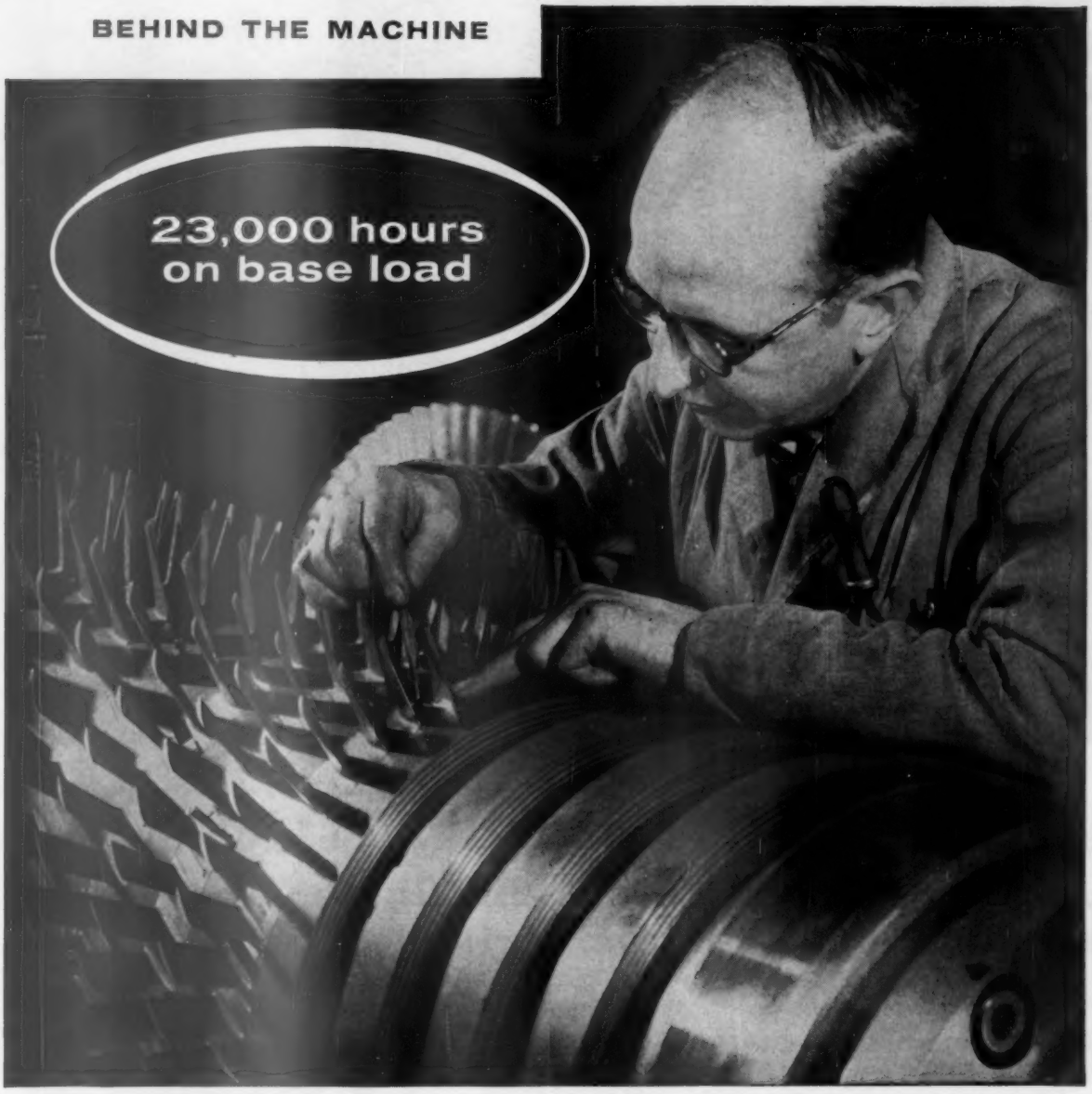
Drill Stem Test information indicated commercial production from Well "B." Well "B" became the producer, flowing in excess of 150 bopd.

You can save money by calling Johnston Testers before you set casing on your next well. Will it be a dry or producing well? A Johnston Drill Stem Test will tell!

JOHNSTON TESTERS

Houston, Texas • Calgary, Canada

BEHIND THE MACHINE



The proved reliability of AEI industrial gas turbines is typified by a machine in Venezuela which has recently completed 23,000 hours running on base load. AEI makes a range of industrial gas turbines with ratings from 1,750 kW upwards designed to run on gaseous or liquid fuels.

The picture shows work on the compressor rotor of L2IC gas turbines being built, at the AEI Turbine-Generator Division Factory for the Basrah Petroleum Co. These feature a single shaft design which ensures stable regulation and makes them particularly suitable for parallel operation with other generating equipment.

This is a product of AEI Turbine-Generator Division, Britain's largest manufacturer of Turbine-Generators.

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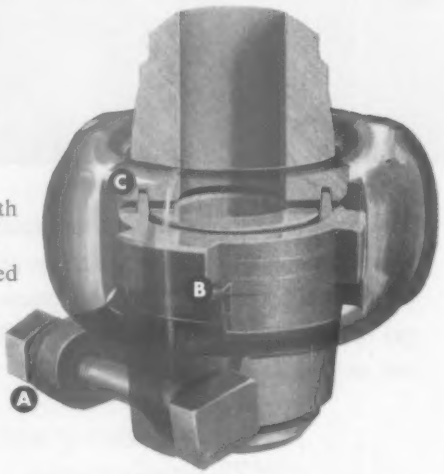
IT COSTS NO MORE TO GO FIRST CLASS . . .

UNIBOLT COUPLINGS are lighter and stronger than flanges, too!

There is no other coupling quite like the UNIBOLT. It is small, light, and compact, yet it is actually stronger than a big, heavy, flanged coupling. (For example, a 2-inch, 3000-lb. w.p. Unibolt Coupling is 28% stronger than a 2-inch, Series 900, flanged connection.) It is available in sizes from 1 inch to 42 inch, in malleable or steel, with loose metal seal ring or renewable resilient gasket, and with threaded hubs or hubs for butt welding. Its parts are interchangeable; it can be installed in close quarters; its vital seating area cannot be damaged accidentally.

So sound is its design that the Unibolt Coupling principle has been applied to all sorts of oil field drilling and production fittings: tees, crosses, positive chokes, adjustable wing valves, ball joints. Also, closures for pipe line scraper traps, blow-downs, product and water filters, and other large diameter pressure vessels.

A complete catalog is yours for the asking.



Note in the illustration above how the tightening of a single tee-head bolt (A) causes identical tapered interlocking shelves in the nut member and on the lug hub (B) to travel against each other. This leverage action exerts tremendous pressure on the seats and seal ring(C).

THORNHILL UNIBOLT **CRAVER CO.**

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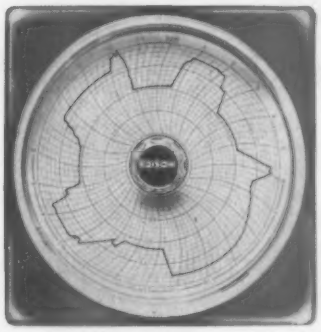
EDISON'S OMNICORDER
NEW MINIATURE INKLESS RECORDER

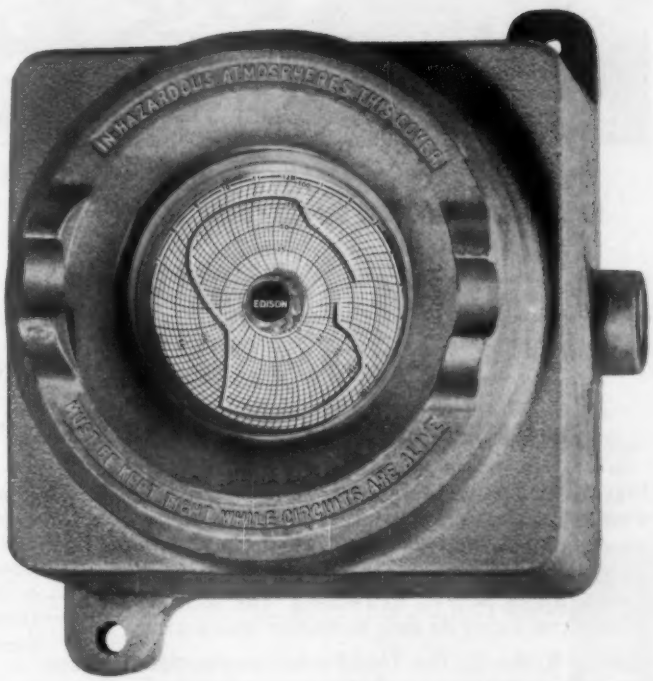


DESIGNED FOR STANDARD, INEXPENSIVE EXPLOSION-PROOF ENCLOSURES

- JUST 3¾" X 3¾" X 3" ■ NO PEN, INK OR RIBBON
- CHARTS EASY TO CHANGE ■ BUILT-IN VARIABLE CHART SPEED
- RECORDS ANY VARIABLE ■ ECONOMICAL

Edison's Omnicorder will record any variable that can be converted to an electrical signal—from thermocouple outputs to flow measurements and power consumption. In addition to its low initial cost, further savings are inherent in Omnicorder because it fits into a standard Crouse-Hinds type GUB110-1-02 instrument enclosure and meets all explosion-proof requirements. Now you can install and operate this precise circular chart recorder at a cost considerably lower than conventional recorders.

The remarkably legible 3-inch chart requires no pen, ink, ribbon or other cumbersome mechanisms. A simple three-speed adjustment regulates chart rotation to provide a variety of time sequences: one hour, one day and seven days per revolution—or one day, seven days and thirty days per revolution. Standard, easily-changed charts are available for electrical measurement, temperature, pressure, flow, and special charts can be designed to fit specific requirements. Omnicorder is operative in temperature ranges from minus 20°F to plus 175°F. For complete information on this rugged, maintenance-free Omnicorder, write for Catalog 3057.



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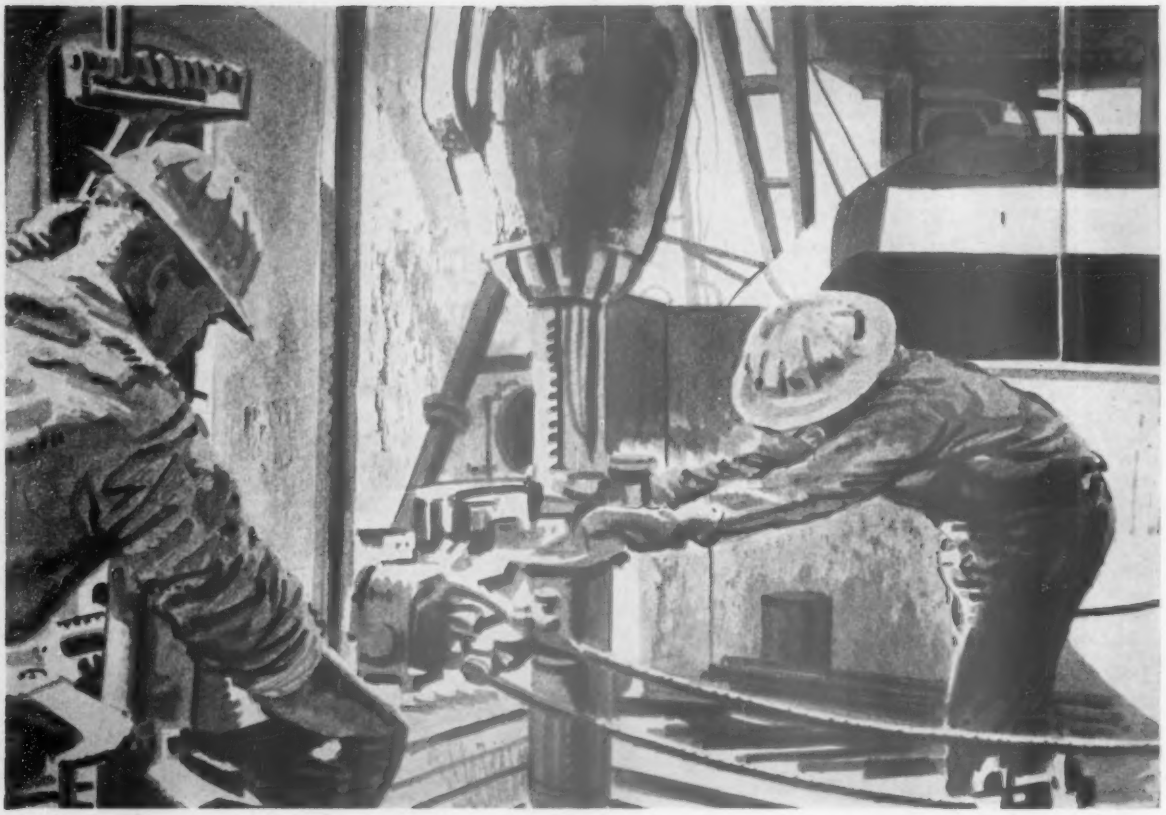

DRILLS 20% FASTER

SMOOTHER THAN STEAM

MAKES 5,000-FOOT ROUND TRIP IN THREE HOURS

Make a 5076-foot round trip out of a 7⅞" hole in only 3 hours and you're really moving that string—especially when you've got only 424 horsepower on the drawworks.

That's what Manahan Drilling Company of Oklahoma City is doing with its newest rig. The secret? The TORQMATIC DRIVE on their Bethlehem drawworks.

Marvin Richards, the Tool Pusher on the rig, says TORQMATIC is the reason they're making round trips so fast—drilling 20% faster—why the rig is far easier to run — one reason why they've never had a breakdown since they got the rig.

TORQMATIC's no stranger to the Manahan camp. This drilling contractor operates another rig with this "smoother than steam" drive—getting the same performance with that rig, too.

"Run up against something in the hole with that TORQMATIC and you won't tear up anything on the rig," Tool Pusher Richards says. "It'll take the shocks and extra strains that would be a problem on a rig without TORQMATIC."

Your drilling, servicing and fracturing jobs will get done a lot faster — with far less trouble — if you have a TORQMATIC DRIVE working for you. They're available from most leading oil field equipment manufacturers — or see your Allison dealer or write Allison Division, General Motors, Indianapolis 6, Indiana. In Canada: General Motors Diesel Limited, London, Ontario.

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TORQMATIC® DRIVES

THE MODERN DRIVE FOR MODERN EQUIPMENT

Descale boilers, heat exchangers, condensers

easily, more safely with non-fuming Dry Acid Cleaners based on Du Pont Sulfamic Acid

EASIER TO USE

Just scoop the dry acid cleaner from lightweight, disposable drum into make-up tank. Often can be added directly to steam-generating, condensing and similar equipment . . . no elaborate apparatus or specially trained personnel required.

SAFER TO HANDLE

These cleaners are dry, non-fuming powders. No danger of broken carboys, spattered liquids, corrosive fumes with sulfamic-based cleaners.

ECONOMICAL

1 lb. of dry acid cleaner does the job of 1.5 lbs. of hydrochloric acid. You'll save on shipping, handling and storage costs.

LESS CORROSIVE

Sulfamic acid is less corrosive than hydrochloric acid; on brass, 60% less; on steel—70%; copper—85%; aluminum—80%. This low corrosion rate permits use with the equipment's own pump. And, with the proper inhibitor, it can be used safely on galvanized steel.

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mail coupon for free booklet and names of formulators who offer these compounds

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MUELLER®

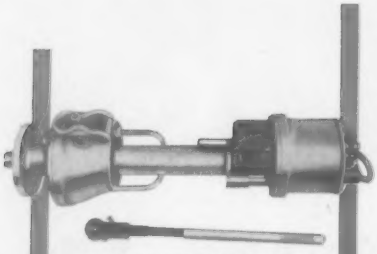
proven *products for water systems*

Assure long, trouble-free operation with a minimum of maintenance by installing dependable Mueller products in all of your water systems.

For more than a century, Mueller Co. has been a leading manufacturer of quality products for the water works industry. Many of these products have been adopted as standards of the water works industry.

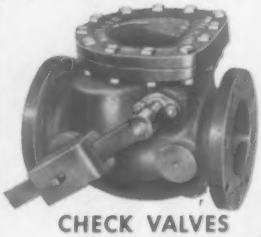
Today, Mueller Co. offers a full line of *proven* products for use in any type of water system. Just a few of these items are shown. Write for complete information. Ask about Mueller products for fire protection systems, too.

Mueller Co. also makes a complete line of No-Blo® Products and Equipment for the petroleum and gas distribution industries.



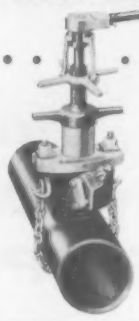
DRILLING MACHINES

GATE VALVES

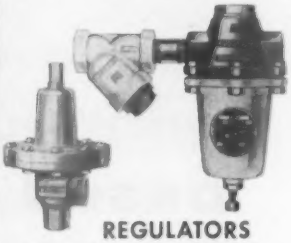


CHECK VALVES

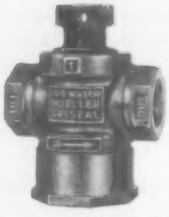
TAPPING SLEEVES AND VALVES



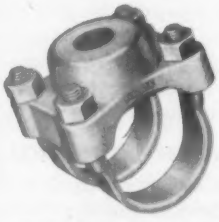
TAPPING MACHINES



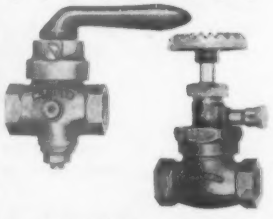
REGULATORS AND RELIEF VALVES



BRASS STOPS



SERVICE CLAMPS



PLUMBING VALVES

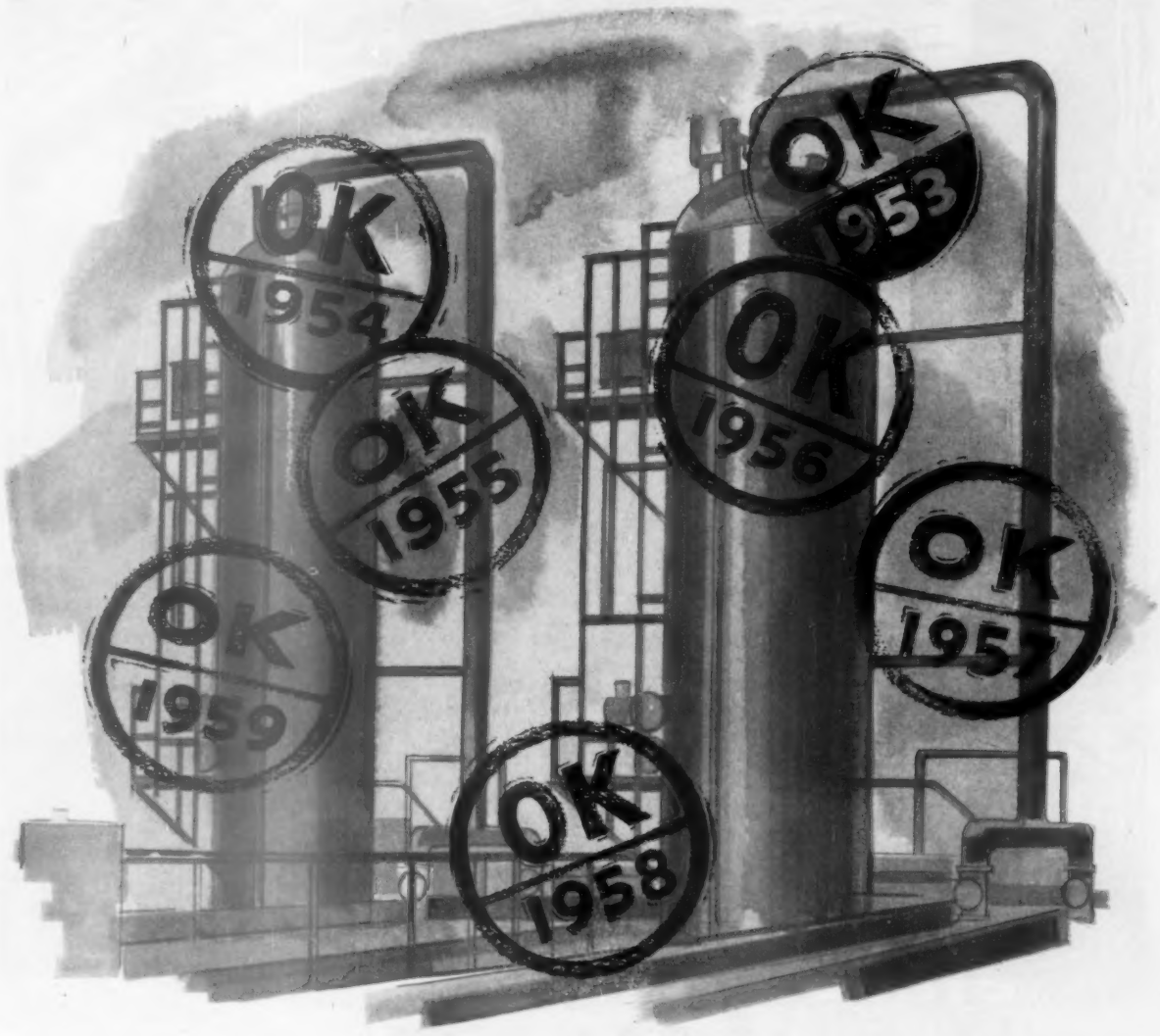
MUELLER CO. since 1857 SERVING the Water and Gas Industries QUALITY

5586

MUELLER CO.

DECATUR, ILL.

Factories at: Decatur, Chattanooga, Los Angeles
In Canada: Mueller, Limited, Sarnia, Ontario



7 years of constant use...

and Davison Silica Gel still meets required dew point

In tower after tower, operation after operation, millions of cubic feet of natural gas are being dried in beds of Davison Silica Gel that were installed two, three and even seven years ago. In one large South Central gas treatment installation, Davison Silica Gel was still effectively removing moisture and maintaining satisfactory dew point after 29,690 consecutive hours on stream.

Davison Silica Gel's proven long-lived efficiency is one of the reasons it is being selected to replace other desiccants in increasing numbers of gas drying and hydrocarborn recovery installations. The higher purity of Davison Silica Gel reduces the possibility of carbon build-up in the desiccant pores. Higher purity, coupled with its larger surface area and granular form, has proven Davison Silica Gel to be an ideal desiccant.

For complete information on the advantages and profit-building potential of Davison Silica Gel for natural gas drying, write Dept. 3102.

GRACE

DAVISON CHEMICAL

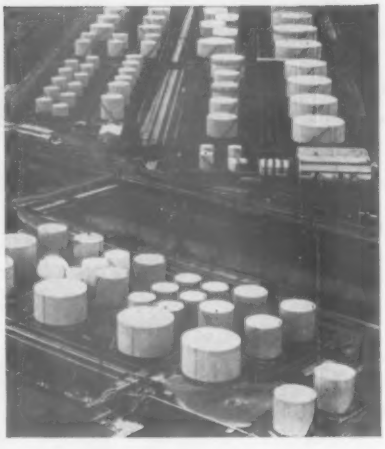
Industrial Chemicals Dept. 3102, Baltimore 3, Md.

Storage can be simple

A phone call to General American solves all *your* bulk liquid storage problems.

General American has *six* terminals close to the nation's top markets, where you can *lease* as much or as little tankage as you require.

When you store with General American, you have no capital investment, no operating problems. You have *flexibility* of inventory and product to meet your needs and the market's opportunities. Tanks can be bonded, if desired. You enjoy complete privacy, with experienced crews on hand to operate individual pipe lines. Blending and packaging equipment, loading docks and other facilities are available as needed.



Your warehouse receipts are A-1 collateral.

Ask the nearest General American office about terminal facilities.

It pays to plan with General American.

Terminals Division

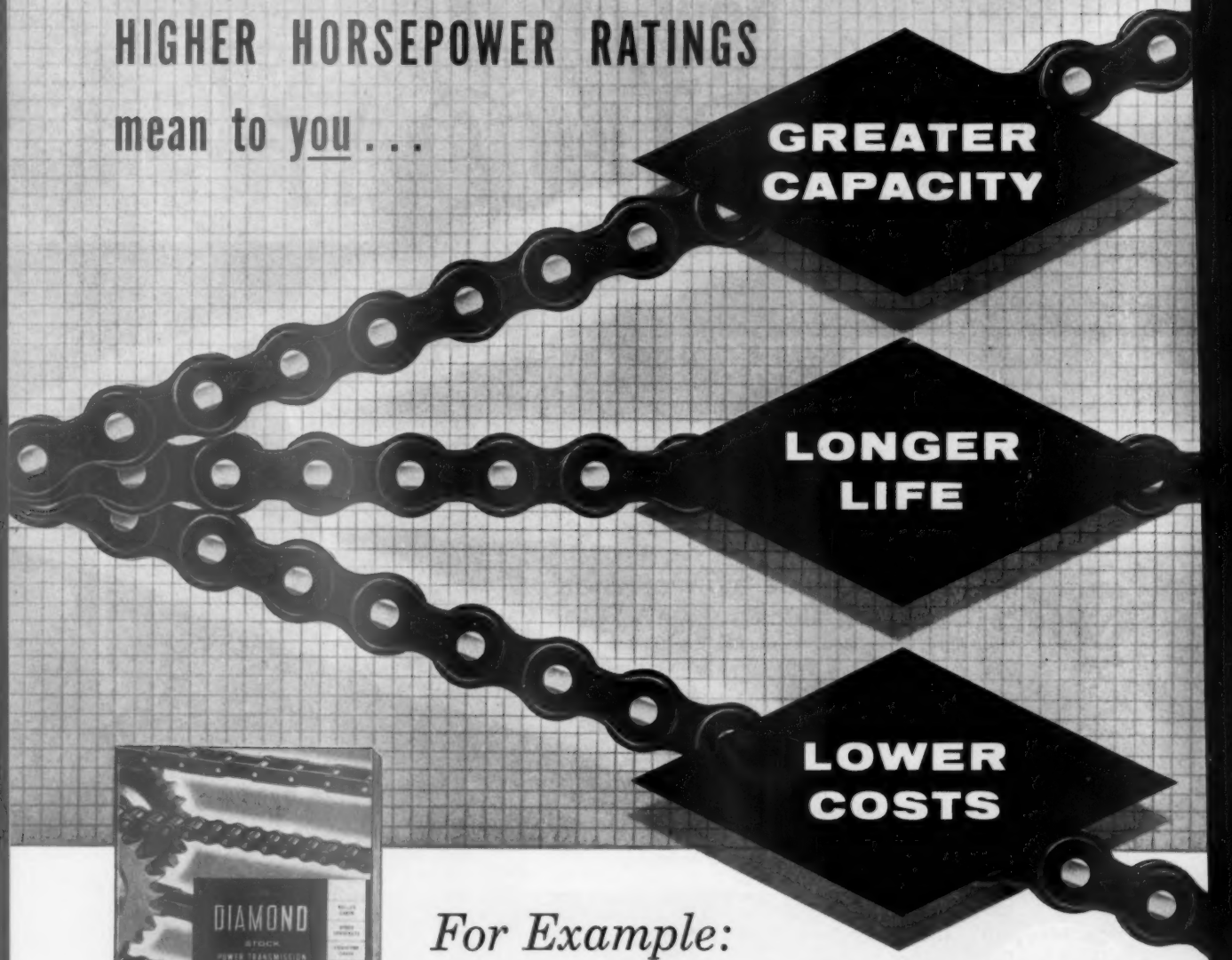
GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street · Chicago 3, Illinois
Offices in principal cities

TANK STORAGE TERMINALS GENERAL AMERICAN TRADE MARK

Terminals located at Carteret, N.J.; (Port of New York) Argo, Ill.; (Port of Chicago) Corpus Christi, Texas; Galena Park and Pasadena, Texas; (Port of Houston) Good Hope, La. (Port of New Orleans).

Here's what DIAMOND Roller Chain's HIGHER HORSEPOWER RATINGS mean to you . . .



Write for New DIAMOND CATALOG No. 760

Just off the press. DIAMOND Stock Roller Chain, Sprocket, and Coupling Catalog No. 760 gives all the new horsepower ratings. Catalog 760 also contains full data on four important new DIAMOND Roller Chain Products: *Micropitch*, *Dura-Weld* and *Tuf-Flex* chains and *Hi-Cap* flexible couplings.

For Example:

Former ratings for 1 inch pitch roller chain permitted sprocket speeds up to 1160 RPM, whereas the *new* ratings include speeds up to 2800 RPM. Similarly, rated *horsepower* capacities formerly did not exceed 49 HP, whereas the new ratings exceed 150 HP. New, higher ratings mean that DIAMOND roller chains are capable of more work, will last longer (thus, cost less to operate) than heretofore considered practical. You now have more opportunities to specify high-efficiency DIAMOND Roller Chain drives . . . both in new equipment designs and in modifications of existing equipment. Write today for *new* DIAMOND Catalog No. 760. *It contains all the new ratings* as established by the Association of Roller and Silent Chain Manufacturers, of which DIAMOND is a charter member.

DIAMOND CHAIN COMPANY, INC.
A Subsidiary of American Steel Foundries
DEPT. 475 • 402 KENTUCKY AVE.
INDIANAPOLIS 7, INDIANA

Offices and Distributors in all Principal Cities

DIAMOND ROLLER CHAINS®

PIPE LINE SERVICE CORPORATION
now offers
X-TRU-COAT

PIPE LINE SERVICE CORPORATION
X-TRU-COAT
PAT. NOS. 2,447,420 - 2,467,642

Contributing once again to the progress of the Gas and Oil Industry, Pipe Line Service Corporation, pioneer in the field of steel pipe protection, offers you the application of X-TRU-COAT.

X-TRU-COAT is a High Density Polyethylene extruded on steel pipe over a pressure sensitive adhesive, produced under the Dekoron process.

Pipe Line Service is the first Independent Coating Company to apply X-TRU-COAT, and is now offering *Immediate, Unlimited Production* at our Sparrows Point, Maryland plant on pipe sizes ½" through 4½" O.D. pipe. X-TRU-COAT will soon be available at our new Youngstown, Ohio plant (presently under construction) in early Spring, 1961.

For prices and complete information about this new service, call or write Pipe Line Service Corporation, P.O. Box 318, Franklin Park, Illinois.

Pipe Line Service Corporation

A SUBSIDIARY OF AMERICAN STEEL FOUNDRIES

General Offices and Plant: Franklin Park, Ill.

Quality pioneers in coating and wrapping pipe for over a quarter century

GUIBERSON

DRILLABLE BRIDGE PLUGS.. *leave no steel in well when set.. short.. easy and fast to drill out*

TYPE B
(Cast Iron)

TYPE WE
(Cast Iron)

Here's where they cut your completion costs..

FOR PERMANENT INSTALLATIONS

Bridge plugs of cast iron.

FOR TEMPORARY INSTALLATIONS

Bridge plugs of magnesium, covered with a plastic coating to resist corrosion.

WHERE HIGH PRESSURE IS BELOW PLUG

Types WE & WME bridge plugs have bridge in upper end. Bridge can be drilled out without disturbing upper slips, so plug remains set while pressures equalize and drilling resumes in complete safety. These plugs are wire line set.

CONVERTIBLE TO DRILLABLE CEMENT RETAINERS

Types B & BM have bridge in lower end which can be replaced by an inexpensive, effective check valve to convert plugs into cement retainers. Drillable drop balls are available to seal in mandrel when pressure work must be done above retainer.

All parts of Guiberson bridge plugs are rigidly held in position. Shock and impact loads are transmitted directly to the mandrel while running in.. reducing the danger of premature setting. Slips are of special heat-treated cast iron. High grade special packing element is designed to handle the extreme pressures and temperatures found in deep wells. Bridge plugs and cement retainers can be set by wire line, tubing or drill pipe.

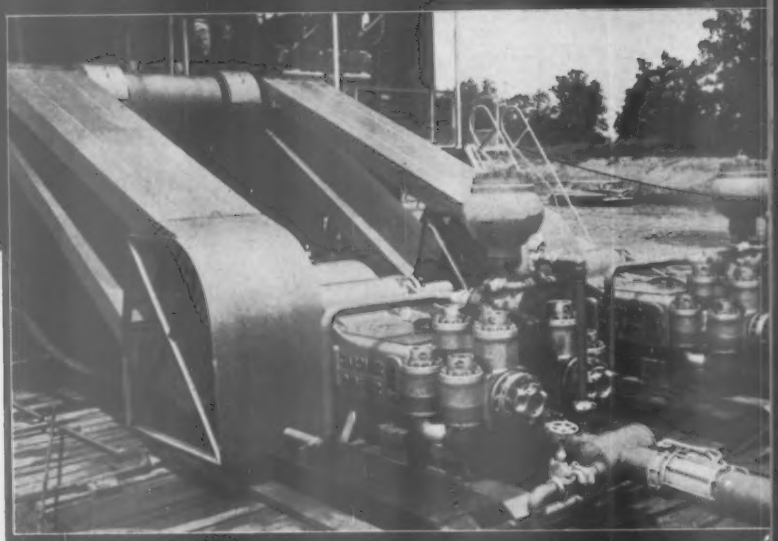
Sold by Oil Field Supply Stores Everywhere

Both plugs are also made in magnesium and are then designated as Type BM and Type WME

THE
GUIBERSON
CORPORATION

ESTABLISHED 1919

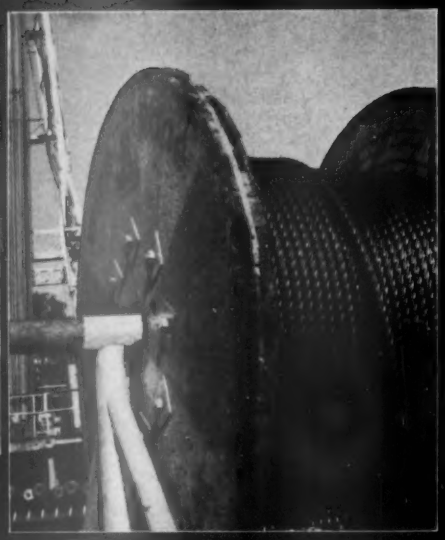
DALLAS, TEXAS U. S. A.



J.L.

SUPPLY

Facts For Drillers



Determined To Cut Costs

If you want reason-why facts about equipment that really does cut costs, let's get together!

J&L drill pipe and wire rope, McDowell "Fast-Line" couplings on light wall steel pipe, Gardner-Denver mud pumps—why be satisfied with hearsay about this and other equipment from J&L when you can have performance facts!

Call your J&L Supply man—or write us at Tulsa, Room 121, Drawer 2481.

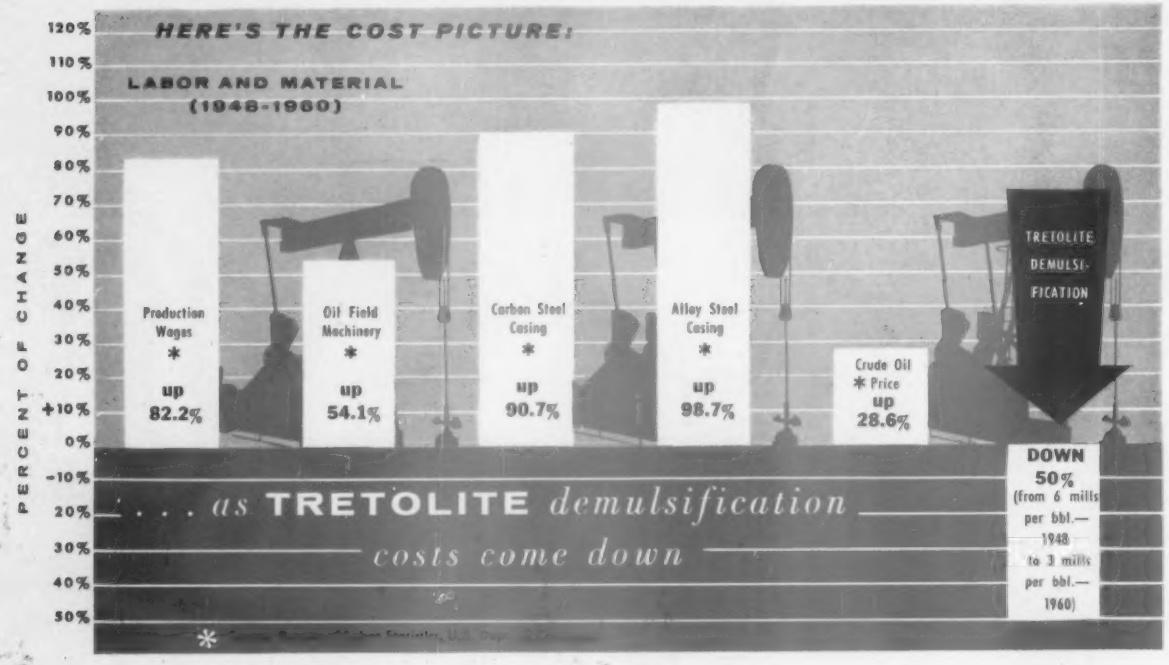
Jones & Laughlin Supply Division—Tulsa

121

another

TRETOLITE SERVICE report

OIL PRODUCTION COSTS ARE STILL GOING UP



. . . and here's the reason:

It's good news in a period of general spiraling costs—the average cost of Tretolite demulsification treatment has been *cut in half* as other production costs have continued to move stiffly upward!

Why? A major part of the answer lies in Tretolite research . . . a continuing program devoted to the development of newer and better formulations, to constant testing, and to improved methods of manufacture.

If you're caught in the cost squeeze, and would like to produce more salable oil at less cost, we invite you to contact your Tretolite Field Service Engineer (the "Man in the Red Car") for helpful cost-cutting suggestions.

Write now for your copy of the new TRETOLITE DEMULSIFIER BROCHURE IT'S YOURS ON REQUEST.

PETROLITE CORPORATION

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369 Marshall Avenue, Saint Louis 19, Missouri
200 South Puente Street, Brea, California

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T-61-1

Oilfield Contractor Frank Turinsky has 20,500 pounds push with his TD-15 Oil Field Special crawler—for fast clearing, digging hard materials, and doing other location jobs. Blade of the 8-foot-wide, outside push-arm dozer is sized to speed pit-digging—"beefed" and braced for tough conditions.

Five-minute "move-outs" are easy for TD-15-equipped contractor Turinsky to make—to hit several locations fast and do them in a hurry. Rig is ready to roll—legally—without "permit" red-tape! Standing, left to right, are Frank Turinsky, and son, Frank, Jr.

"My TD-15 has small tractor advantages yet outdozes anything in the oil fields"

—Frank Turinsky, Mounds, Oklahoma

"This International TD-15 Oil Field Special is the tractor I have always needed," states Contractor Frank Turinsky, Mounds, Oklahoma.

"The 8-foot over-all width is so important in digging pits and hauling legally. I've been using smaller tractors—trying to stretch their ability to 'sub' for a big machine.

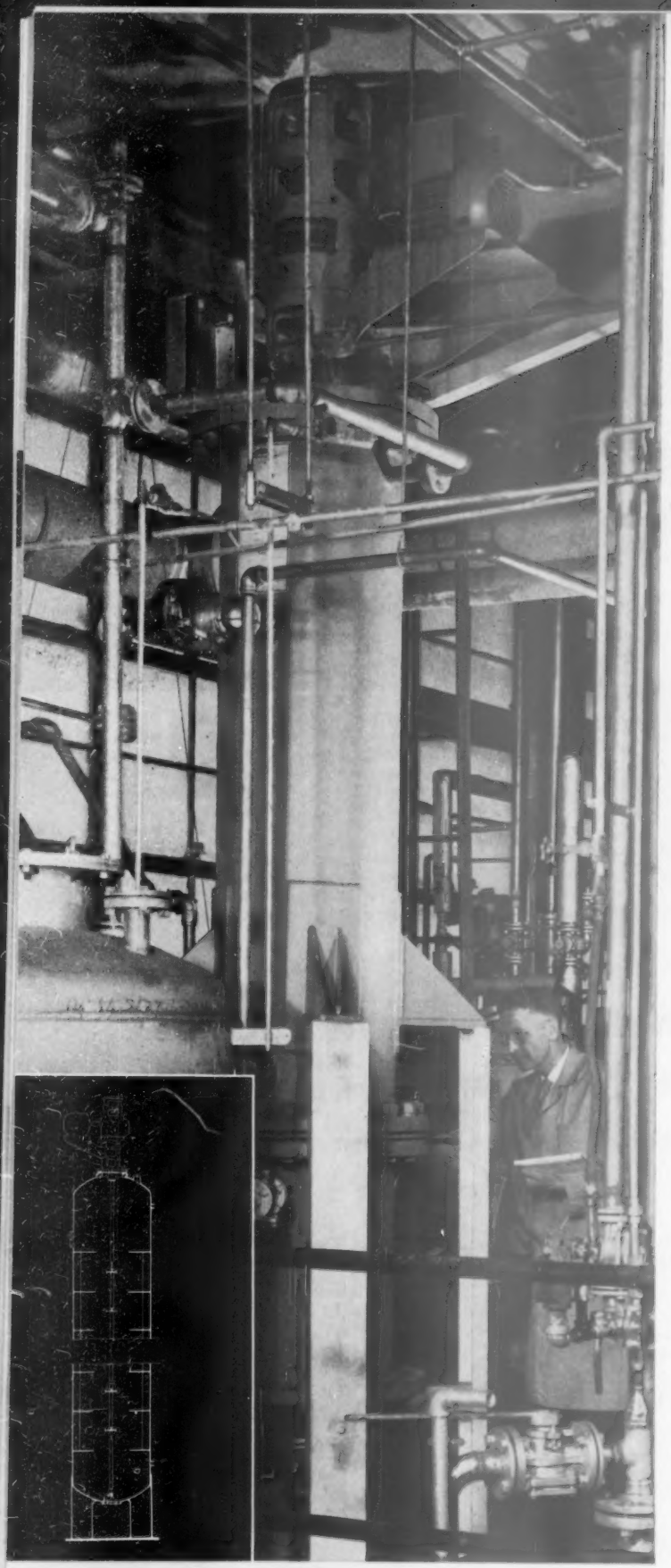
"Now we have a tractor that retains all small tractor advantages, yet outworks any other oil field 'dozer.

"We can make money on the small jobs because the TD-15 can move in fast and do them in a hurry—and no job is too big for the '15' to handle with ease."

Prove you can outwork and outearn "the others"—with the TD-15's 20,500 pounds push. See how the 6-speed, full-reverse transmission with single-stick and Shuttle-Bar Control, teams with the fast-slugging, 6-cylinder-smooth TD-15's Diesel engine. Prove 62-inch-gauge stability, maneuverability, and easy truckability. Let your International Construction Equipment Distributor demonstrate.

International® Construction Equipment

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Ill.
A COMPLETE POWER PACKAGE



CMCONTACTOR can be pilot plant size or as large and as high as needed. Corrosion-resistant materials are readily supplied. Here a CMContactor reclaims a chemical from process liquor at photo chemicals division of Eastman Kodak Company.

LIGHTNIN CMCONTACTOR®

new multi-stage mixing column handles anything that flows

Don't freeze your plans for "going continuous" on a process until you've had a chance to see what the new LIGHTNIN CMContactor can do for you.

In one package it combines mixer and process vessel, designed to fit your needs, in materials of your choice. It can accommodate *any* fluids, including gas dispersions, heavy slurries, and thick viscous liquids.

It handles any type of continuous operation. And it gives you predictable results.

Here's why you'll find you can get results with the CMContactor that you can't get any other way:

1. **No fouling or plugging.** Simple, self-cleaning design makes it possible to handle fluids of high solids content. Solids can be carried through with the flow stream, settled against the liquid flow current, or retained in the column.
2. **No guessing when you scale up.** Fully baffled system means a controlled flow pattern within each stage, free from problems of channeling, wall effects, packing wettability, and head differentials. Pilot plant conditions can be duplicated with precision in columns of any size.
3. **Selected mixer speed for each flow rate.** As flow rate changes, mixer speed can be adjusted to give optimum performance for that specific throughput.

We help you pilot-plant the process. We'll test-run it for you in our own laboratory. Or you can rent or buy a pilot CMContactor and we'll help you with your own test runs.

To get a fuller idea of the efficiency this versatile new process tool can bring to your operations, call in your LIGHTNIN Mixer representative now. You'll find him listed in Refinery Catalog and in the yellow pages of your telephone book. Or write us direct.

Lightnin® Mixers

MIXCO fluid mixing specialists

MIXING EQUIPMENT Co., Inc., 174-b Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 19, Ont.

In Europe: Lightnin Mixers, Ltd., Poynton, Cheshire, England.

OIL KING!

Acknowledged so

by oil men who have used all kinds of gauges

The ten-gallon hat on the Marsh Mastergauge is worn as a crown of acceptance, an emblem of excellence... well earned through years of rugged oil country service.

Just as kings ascend thrones through lineage, the Mastergauge was destined for "royal" acclaim the day it hit the drafting board. Because every product born at Marsh is "born to the purple."

For what other gauge has the Marsh heritage of functional design innovations? Only Marsh offers Conoweld construction, the Marshalloy case, "coined" sector Mastergauge movement, "Recalibrator" adjustment, and optional Safecase protection plus.

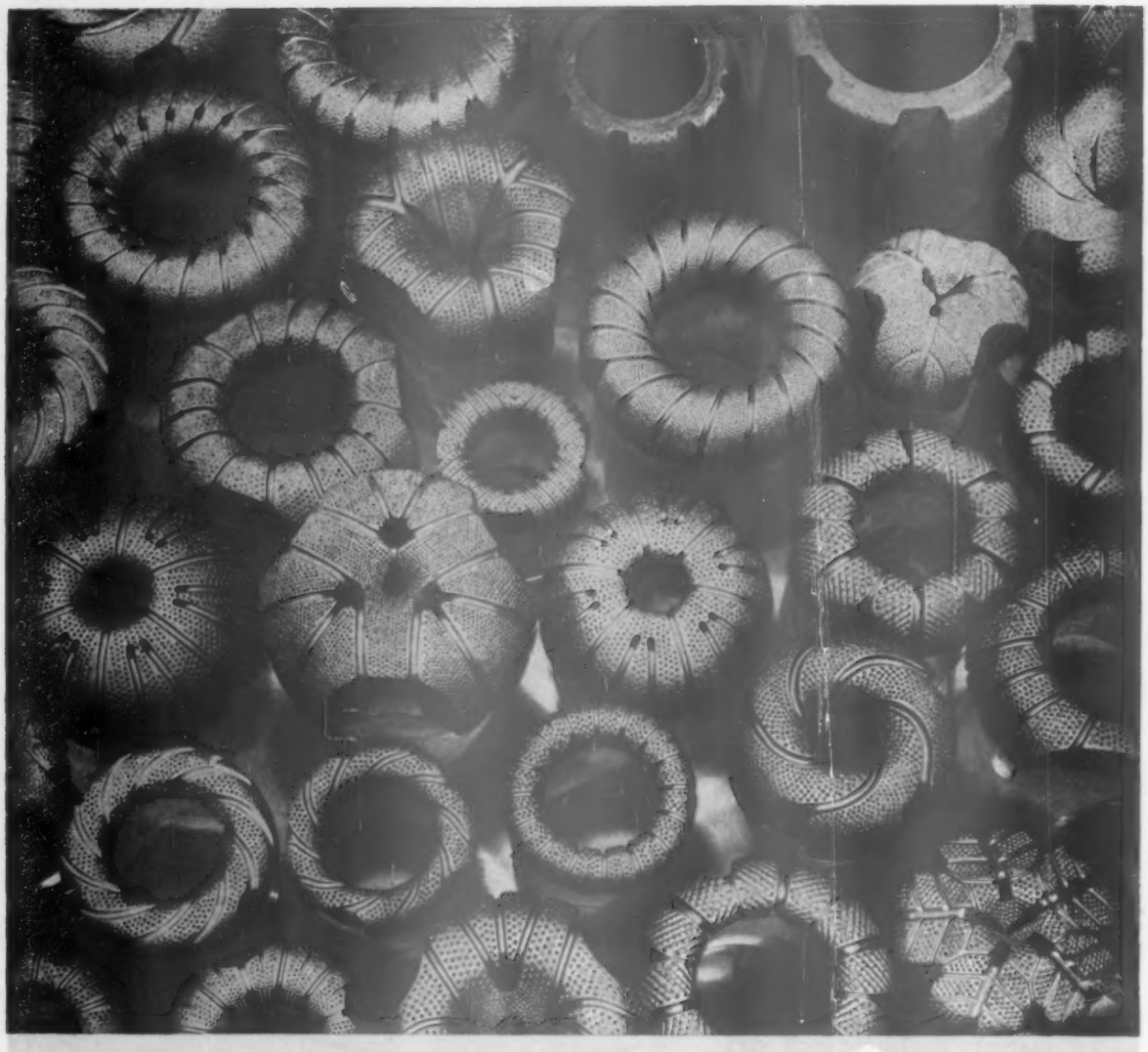
That's why we say the *next* great thing that happens in gauges will happen at Marsh.

MARSH INSTRUMENT COMPANY, Dept. L, Skokie, Ill.
Division of Colorado Oil and Gas Corporation
Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta
Houston Branch Plant, 1121 Rothwell St., Sect. 15, Houston, Texas

MARSH GAUGES

In stock at your nearest Supply House

"THE STANDARD OF ACCURACY"



There are many Styles of Diamond Bits . . .

. . . because Christensen "custom engineers" diamond bits to overcome particular problems. On that next drilling, coring, reaming, or fishing job, ask your nearest Christensen office about diamond bits designed for you

"Less cost per foot"

CHRISTENSEN DIAMOND PRODUCTS

MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST

SALT LAKE CITY, UTAH

SERVICE FROM WORLD-WIDE SALES OFFICES AND MANUFACTURING PLANTS

Now! The LUNKENHEIMER BALL VALVE

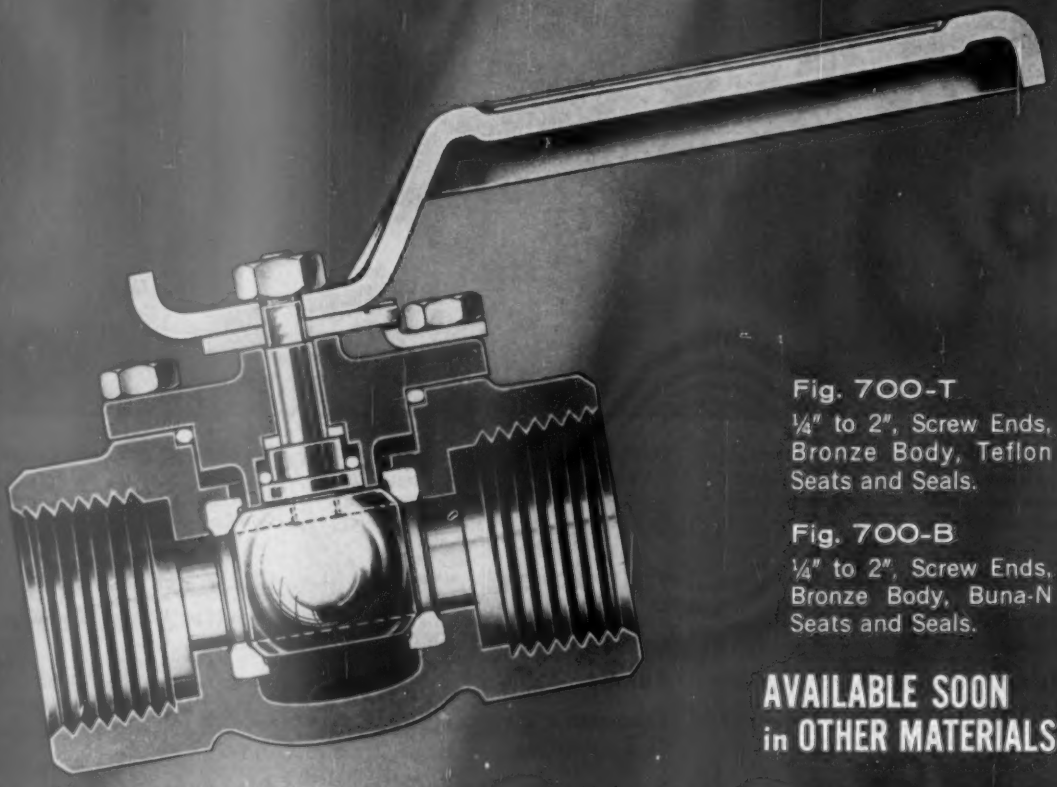
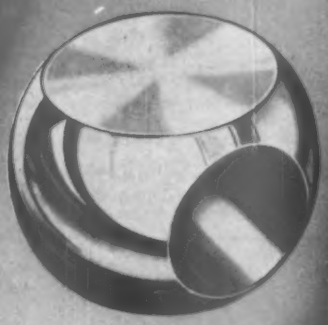


Fig. 700-T
¼" to 2", Screw Ends, Bronze Body, Teflon Seats and Seals.

Fig. 700-B
¼" to 2", Screw Ends, Bronze Body, Buna-N Seats and Seals.

AVAILABLE SOON in OTHER MATERIALS

New Top-Entry Design



Engineered with traditional Lunkenheimer quality . . . self-aligning ball seals against both seats . . . long-lasting resilient seats for tight shut-off . . . straight-through flow . . . quarter-turn operation . . . top entry for easy maintenance

Order from your Distributor

or write The Lunkenheimer Company, Cincinnati 14, Ohio

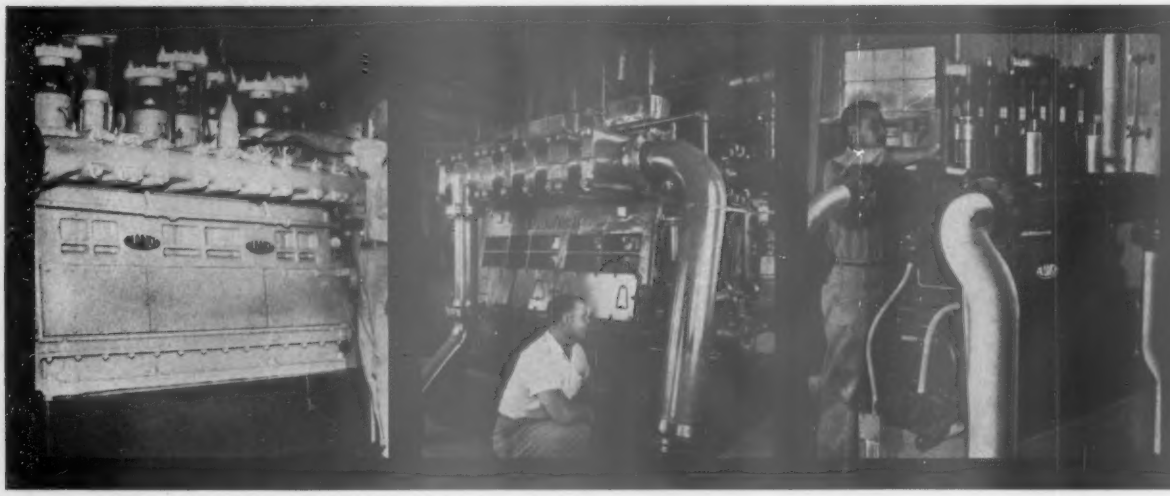
L-960-3

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

• BRONZE • IRON • STEEL • PVC

6 field reports show:
Aldrich pumps deliver dependable,



Mobil Oil Company reports:
"Aldrich Pumps were selected because of previous dependable and economical service . . ."

FIELD REPORT

Service: Water flooding at Pegasus Unit

Pumps: Two Aldrich Septuplex

Operation Started:
February, 1955

Experience to Date:
Pumps continuously deliver brine to two formations—90 gpm at 2,500 psi; 150 gpm at 1,000 psi. Customer reports: "Routine maintenance only. Aldrich pumps were selected because of previous dependable and economical service."

Gulf Oil Corporation reports:
"All maintenance in pumping station handled by one man during eight-hour day."

FIELD REPORT

Service: Water flooding at Goldsmith-San Andreas Unit

Pumps: Four Aldrich Quintuplex

Operation Started:
October, 1954

Experience to Date:
After six years, three pumps operate 24 hours a day, delivering some 54,000 bbl/day of sour oil field brine at 750 to 800 psi. Station designed for automatic operation. All maintenance handled by one man during eight-hour work day.

Superior Oil Company reports:
"Pumps handling only fresh water have not been repacked since operation began . . ."

FIELD REPORT

Service: Water flooding at New Harmony Unit

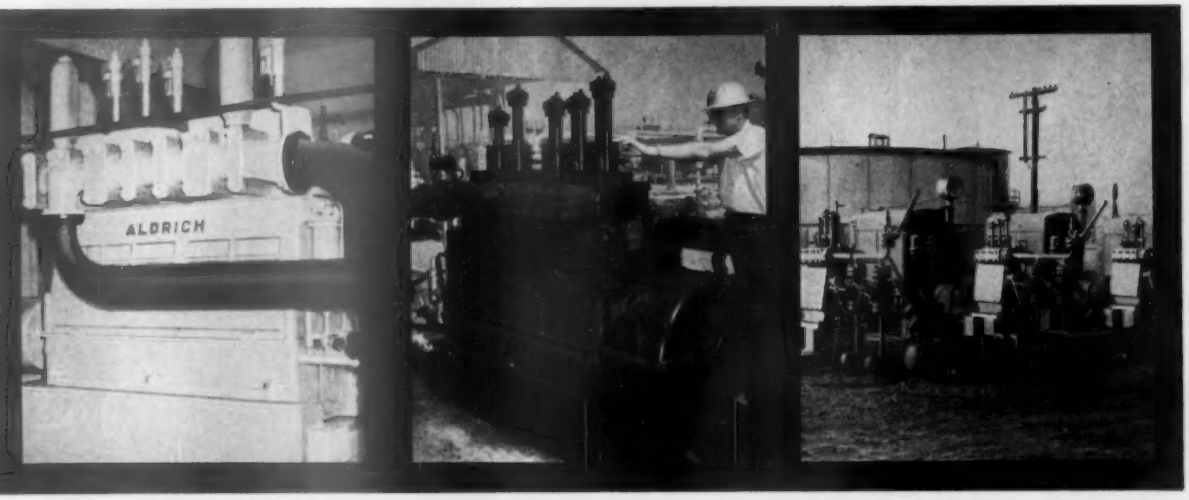
Pumps: 4 Aldrich Quintuplex

Operation Started:
May, 1957

Experience to Date:
Pumps continuously deliver mixture of fresh and produced water to two formations—16,000 bbl/day at 1,450 psi. Customer reports: "Aldrich pumps were selected because of previous experience and new improvements."

FIELD PARTS STOCK AVAILABLE in Houston, Odessa, Alice and Wichita Falls, Texas; Casper, Wyo.; Hobbs, N.M.; Carmi, Ill.; Charleston, W. Va., Tulsa, Okla.; Los Angeles, Calif.; Calgary, Ontario.

trouble-free performance



South Saskatchewan Pipe Line Co. reports:
"Exceptionally fine field service, routine maintenance only."

FIELD REPORT

Service: Crude Oil Pipeline

Pumps: 3 Aldrich Quintuplex

Operation Started:
December, 1955

Experience to Date:
Pumps with 4½" plungers, 6" stroke, each have a capacity of 20,000 b/d at 300 RPM, 1200 pounds pressure. Units pump viscous crude oil over 158 miles of 16" main line pipe. Customer reports exceptionally fine field service with routine maintenance only.

Pan American Oil Company reports:
"Only routine maintenance has been needed."

FIELD REPORT

Service: LP-Gas Injection at Burnell-North Pettus Cycling Plant

Pumps: Aldrich Quintuplex

Operation Started:
June, 1950

Experience to Date:
Pumps operate in continuous service delivering 52 gpm at 3,000 psi. Routine maintenance annually . . . plungers are repacked as necessary. Customer reports: "complete satisfaction" with the performance of the Aldrich pump.

Union Oil Co. of Calif. reports:
"The plunger packing and valve discs on these pumps have been replaced only once to date."

FIELD REPORT

Service: Water flooding at Hellman-Reyes

Pumps: Five Aldrich Triplex

Operation Started:
July, 1954

Experience to Date:
Pumps are in continuous service, delivering 10,000 B/D at 1,300 psi. Customer reports: "No mechanical breakdowns of any type on these pumps . . . plunger packing and valve discs replaced only once to date."

Aldrich Direct Flow Pumps are designed to give pump users everywhere economies of operation, maintenance and repair not possible with conventional pumps. Aldrich design innovations include . . .

DIRECT FLOW DESIGN. Two right angle turns are eliminated in the fluid-end block. The liquid being pumped travels in a straight, horizontal line from suction to discharge manifold.

FLUID-END SECTIONALIZATION. Valves can be removed for inspection or replacement without special tools or equipment. Sections can be replaced at a fraction of the cost of conventional type fluid-ends.

INVERTED PUMP DESIGN. Makes fluid-end easily available for maintenance.

If you are looking for sustained pump performance with minimum maintenance costs, it will pay you to know more about the Aldrich line. Write today for a catalog giving complete specifications.

ALDRICH PUMP COMPANY
9 Gordon Street • Allentown, Pennsylvania

the tough pumping problems go to ALDRICH

HANDLES "MOON" TEMPERATURE EXTREMES!

New low temperature insulation handles jobs in − 300° F. to + 220° F. range

Of course, this new Unarco U200 insulation is not in use on the moon . . . but it could be, because it handles temperature extremes even greater than would be required on this bleak island in space.* What's more U200 does it without thermal shock effects anywhere along the line.

A new, extremely lightweight, closed cell synthetic, U200 has excellent heat and chemical resistance. Its K factor is only 0.14 at 70° F. mean temperature . . . lowest on the market. Density is only 2.3 lb. per cubic foot. Yet this remarkable, new material has high compressive and flexural strength. It's non-toxic and easy to handle, too.

Try it just once and you'll see how quickly and easily it can be cut and applied with a very minimum of standard hand tools. It can actually reduce application costs by as much as 50%.

Available in accurate, half-round sections; in nominal thicknesses and in standard pipe sizes. Individual sections 36 inches long. Also available in 12″ x 36″ block form—1″ to 5″ thickness in ½″ increments.

(*) *−243° F. to +214° F. Estimated moon temperatures as listed in a leading American encyclopedia.*

Get complete engineering specifications and other details before another day goes by.

Write today on your company letterhead for Unarco Bulletin No. U200-1.

MILLIONS OF CLOSED CELLS MAKE U-200

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- Vapor Resistant
- Efficient
- Lightweight
- Easy to Handle

*Closed cell content of 85% plus.

U-200 POLYURETHANE FOAM

The insulation with "Handleability"

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UNARCO PRODUCTS

• UNIBESTOS, Amosite Asbestos Pipe Covering and Block • Calcium Silicate Pipe Covering and Block • 85% Magnesia Pipe Covering and Block • Mineral Fiber Block • Wrap-On Insulation • Lace-On Insulation • Turbine Blankets • Insulating and Finishing Cements • Asbestos Textiles • Packing and Gasketing.

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Fibrous Products Division • Dept. 206, Bloomington, Illinois

ONLY VISIBLE BLADES GIVE YOU SAFETY YOU CAN SEE!

• The men who pull the switches will tell you what can happen when a switch, *believed* to be open —*isn't*. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on **V**isible **B**lade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more...why settle for less?

MAIL the coupon for latest Safety Switch Bulletin

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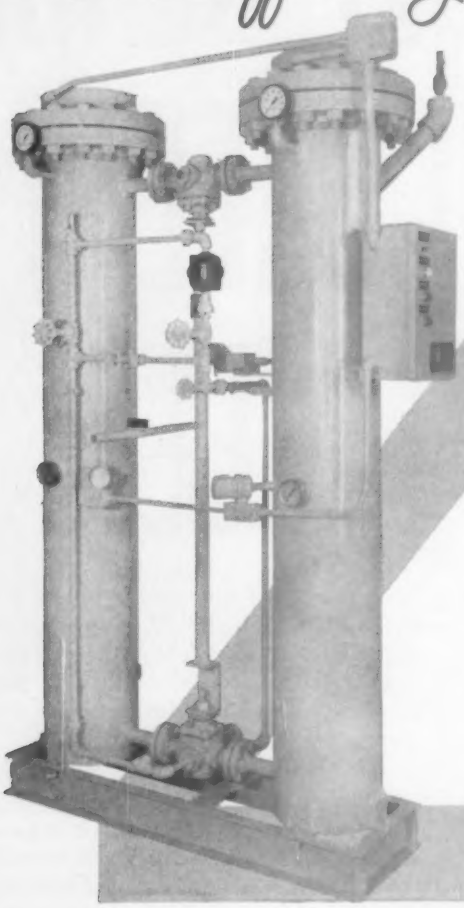
KEMP ORIAD DESICCANT DRYERS

cut costs, add efficiency 4 ways!



1 Complete reactivation

An exclusive 3-zone embedded heater design gives every Kemp Oriad Desiccant Dryer extra drying power *economically* (effective distribution of heating elements assures high heat transfer efficiency). The most complete reactivation results... providing maximum desiccant capacity, minimum dewpoint performance.

2 Full automatic operation

Set the program timer and everything is regulated automatically. Gases are dried with the least pressure loss, lowest maintenance and operating costs. Your choice of manual or semi-automatic systems, too.

3 Accurate temperature control

Thermostatic control conserves heat input... maintains ideal temperatures for highest operating efficiency in drying instrument air, process air and gases to the lowest dew point, eliminating condensation or freeze-up, and other applications.

4 No moving parts

There are no blowers, fans or motors to create maintenance problems, rising operating costs. Unit comes fully assembled, ready to go. Liquid dryers also available. Write today for Bulletin D-103, or contact your Kemp man, listed in the Chemical Engineering Catalog.

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THE C. M. KEMP MANUFACTURING COMPANY
405 E. Oliver St., Baltimore 2, Md.

NEW BELLOWS FLOW TRANSMITTER

gives you field indication plus convenience and precision

You get all the economy and convenience of pneumatic transmission and all the efficiency of the bellows meter body plus field indication, when needed, in the new Honeywell Bellows Flow Transmitter. Use it in any application to transmit flow or liquid level measurements in open or closed tanks.

This new meter has automatic ambient temperature compensation and two-way overload protection for 100% of span. Maintenance is greatly simplified by modular construction which lets you remove any major component by loosening two screws. All field adjustments are easily accessible, and a self-locking feature prevents upset after calibration adjustments are made.

New Bellows Transmitter is available with a concentric scale or as a non-indicator. It has 16 ranges—from 0-10 inches of water to 0-400 inches of water.

You can change ranges in the field simply by removing a single spring assembly and replacing it with an assembly of the desired range . . . adjust damping quickly and accurately, while the instrument is in operation . . . install the meter with either vertical or horizontal piping, so that it vents, drains and purges itself. The meter transmits with calibrated accuracy of ±0.5% of full scale, and indicates within ±1.0% of full scale.

For complete details on the new Bellows Flow Transmitter, call your nearby Honeywell field engineer. Or write MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.—In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

First in Control

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Delivered to the installation site by rail, truck or boat, shop-assembled Vogt Package Water Tube Boilers can be quickly placed in operation. After being placed from the carrier onto a simple low-cost concrete slab, a Vogt unit requires only piping, electrical and stack connections to go to work.

Little space is required because of their compact design and integrated firing equipment and controls.

A pressure type steel casing permits outdoor operation, if desired, eliminating the need for an expensive building.

Write for literature. Address Dept. 24A-BO

Vogt

PACKAGED BOILERS

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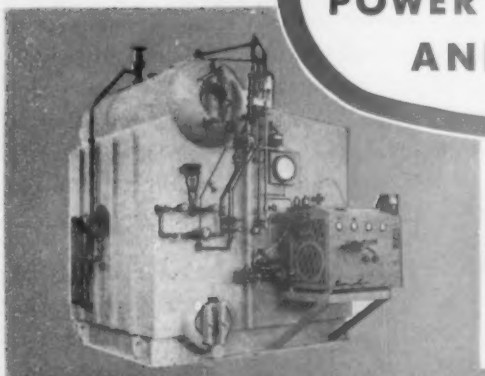
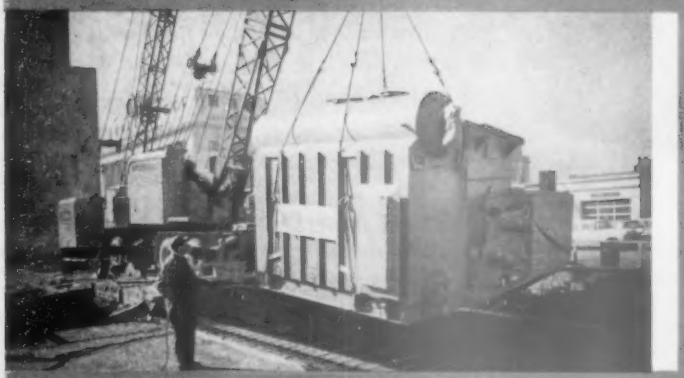
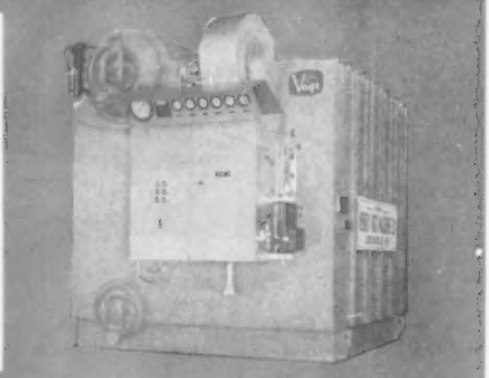


BOX PLANT — A 10,000 pounds/hour unit

HOSPITAL — Two 30,000 pounds/hour units



PRINTING PLANT — Two 20,000 pounds/hour units



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Package Unit Bulletin PSG-3 available on request

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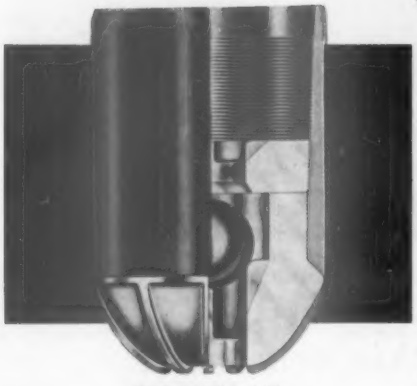

RECTOR TYPE "A"
FLOAT SHOE

Precision machined from seamless steel tubing. Internal parts are high-strength, drillable aluminum alloy. Moulded rubber-covered float ball insures positive seating.

DRILLABLE ALUMINUM NOSE MAKES RECTOR TYPE "A" CEMENTING EQUIPMENT A WINNER EVERY TIME

The ribbed aluminum guide nose on RECTOR'S Type "A" float shoe is your best bet for getting pipe safely "on bottom" every time. Made from a special aluminum alloy, developed by RECTOR, it provides far greater impact, compression, tensile and shear strength than either concrete or bakelite. RECTOR'S aluminum guide nose guides the cementing shoe past ledges, bridges and other obstructions without danger of breaking. On completion, the aluminum alloy can be drilled out easily, and because there is less material to drill out, it drills out faster.

This superior feature is yours at no extra cost . . . So, for dependability, and exacting performance in all cementing operations, put your money on a sure winner. Specify RECTOR Type "A" cementing equipment from your favorite supply store or see your RECTOR representative.

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EXPORT REPRESENTATIVES: Continental-Emsco Co., Mid-Continent Supply Co., Oilwell Division of United States Steel Corporation

How much CF&I Casing and Tubing *should go into this new well?*

Someone once asked Abraham Lincoln, "how long should a man's legs be"? The president replied, "long enough to reach the ground". The same is true of CF&I Seamless Casing and Tubing. You need enough to protect your investment and bring oil to the surface.

Why should you insist on CF&I Casing and Tubing? Because it is made from top grade steel . . . subjected to strict quality control throughout every stage of production . . . and meticulously manufactured in one of the most modern mills in the industry.

CF&I's Seamless Casing and Tubing mill is only hours away from the heart of the oil country. This assures rapid delivery — either directly from our Pueblo, Colorado mill or through our network of strategically located distributors.

All CF&I Casing and Tubing exceeds API Specifications. It's available in sizes 2⅜" to 9⅝" O.D. For complete information or technical service, contact a nearby CF&I sales office.

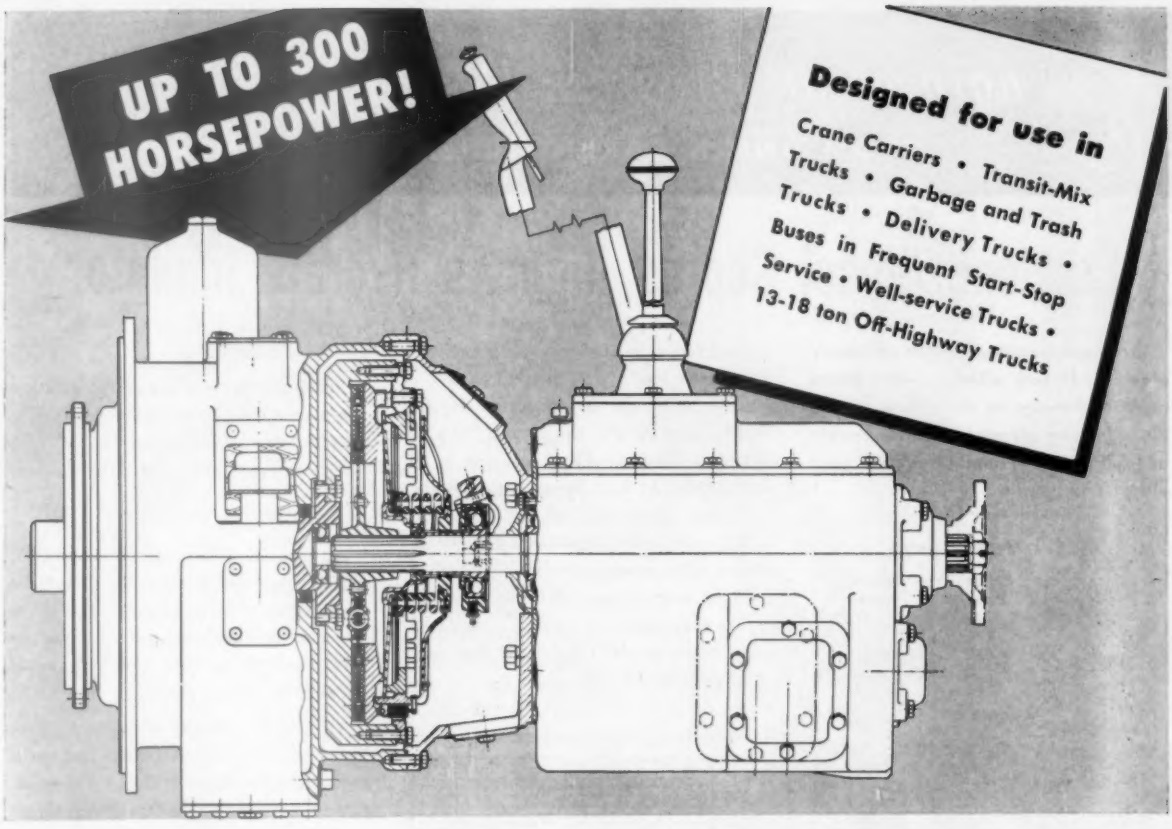
CF&I STEEL

SEAMLESS

casing and tubing

API

THE COLORADO FUEL AND IRON CORPORATION • DENVER, COLORADO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NEW Torque Converter—Transmission Packages from TWIN DISC

- ***Choice of standard mechanical transmissions—Fuller, Spicer or your own design***
- ***Standard mechanical spring loaded clutches—Lipe or Spicer***

Twin Disc's new torque converter-mechanical transmission units are the result of a design project in which Twin Disc engineers worked in close cooperation with engineers of leading transmission manufacturers. What they perfected is a "package" designed to meet specialized power transmission needs—the needs of vehicles engaged in frequent start-stop service or subject to wide variations in load conditions.

With a Twin Disc converter-transmission package, users of such vehicles can realize these important benefits:

- Automatic torque multiplication in all gear ratios
- Sudden load increases easily handled without shifting gears
- Smooth, effortless starting—engine stalls completely eliminated
- "Fluid cushion" protection throughout the drive train for less downtime, longer life
- Increased driver efficiency because operation is far less fatiguing

The new Twin Disc package offers several advantages over other converter-transmission units. Capacity range is greater—up to 300 hp and 650 lb-ft of torque. Furthermore, Twin Disc permits the user to select the make of transmission he prefers. A third "plus" feature is the fact that Twin Disc uses a standard spring-loaded clutch which provides the familiar "feel" that vehicle operators want.

Twin Disc engineers will be glad to work with you in adapting this converter-transmission package to your vehicle's requirements.

Send for Bulletin 511

TWIN DISC

TWIN DISC

Torque Converters

TWIN DISC CLUTCH COMPANY
RACINE, WISCONSIN
HYDRAULIC DIVISION, Rockford, Illinois

Engineering Progress Report
FROM UNION CARBIDE CHEMICALS COMPANY

Ethylene Glycol Scores High As Hydrate Inhibitor

In refrigeration-type gasoline recovery plants, the most widely used hydrate point depressant is diethylene glycol. But, ethylene glycol may offer certain advantages as a replacement in your plant, for example . . .

SELECTION GUIDE

ADVANTAGE	Ethylene Glycol	Diethylene Glycol
Hydrate Inhibition	GOOD	GOOD
Ease of Separation	BETTER	GOOD
Cost	LOWER	—
Vaporization Loss	LOW	LOWER
Solubility Loss	LOWER	LOW

HYDRATE INHIBITION

While both ethylene and diethylene glycol give good hydrate inhibition, with hydrate point depressions generally in the range of 60° to 80°F., reports indicate that ethylene glycol may give a greater depression in those cases needing very low separation temperatures.

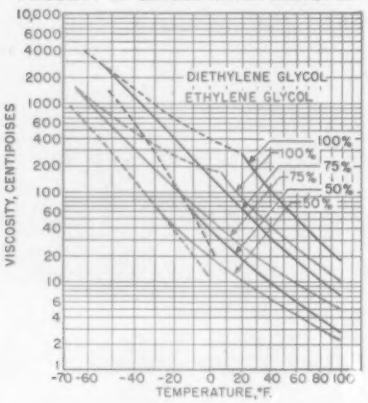
EASE OF SEPARATION

Ethylene glycol-water solutions are easier to separate at very low temperatures than diethylene glycol-water solutions.

This advantage is illustrated in the graph below. At 0°F. the viscosity of a 50 per cent ethylene glycol solution is 20 centipoises, or half the viscosity of the diethylene glycol solution.

An even more marked difference is shown at lower temperatures . . . at—40°C. a 75 per cent ethylene glycol solution has a 300 centipoises viscosity, as compared with 1000 to 2000 for a 75 per cent diethylene glycol solution.

VISCOSITY OF GLYCOL-WATER MIXTURES



COST

Ethylene glycol costs 1¾¢ a pound less than diethylene glycol which means a possible tank car savings of $1,300.

VAPORIZATION

Although ethylene glycol vaporization losses are greater than diethylene glycol's, the difference is insignificant below 30°F., if separator pressure is 750 PSI or higher.

SOLUBILITY

At separation temperatures of 60°F., glycol losses due to solubility should be in the range of 10 to 50 ppm when 50 to 75 per cent ethylene glycol solutions are used; and 20 to 100 ppm with equal strength diethylene glycol.

The higher volatility of ethylene glycol must be taken into consideration in regeneration equipment design and operation; but ethylene glycol may offer advantages in certain systems. Your CARBIDE Technical Representative can show you data on the pros and cons of ethylene or diethylene glycol hydrate inhibition in your system.

For a copy of a new report, "The Glycols as Hydrate Point Depressants in Natural Gas Systems" and a comprehensive bibliography of all the major articles published on gas sweetening and dehydration in the last 25 years, use the coupon.

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Please Send Me

☐ Technical data report—"The Glycols as Hydrate Point Depressants in Natural Gas Systems."
☐ 24-page Gas Sweetening Bibliography.
☐ Please have a CARBIDE Technical Representative call.

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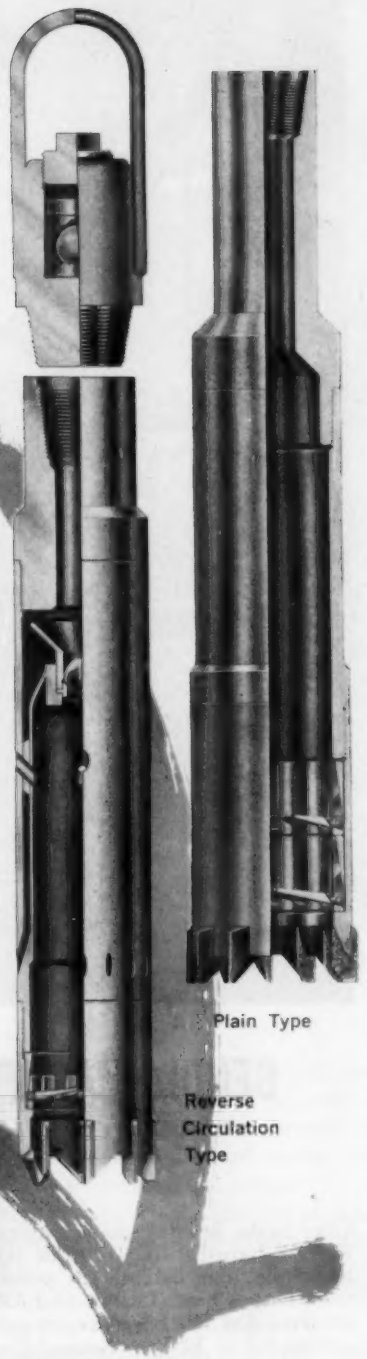
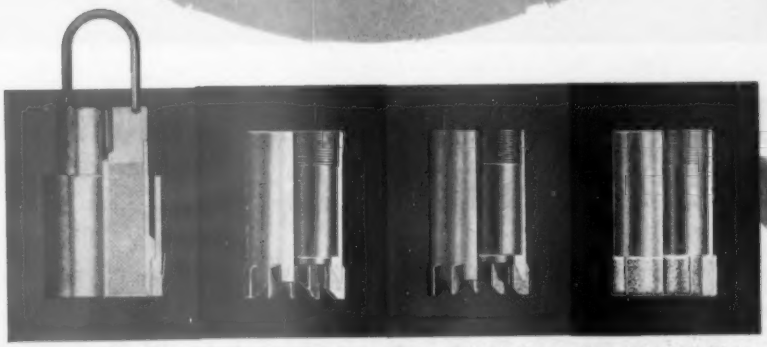


Plain Type

Reverse Circulation Type



Magnet Inserts | Type "A" Mill Shoe | Type "B" Mill Shoe | Type "C" Mill Shoe

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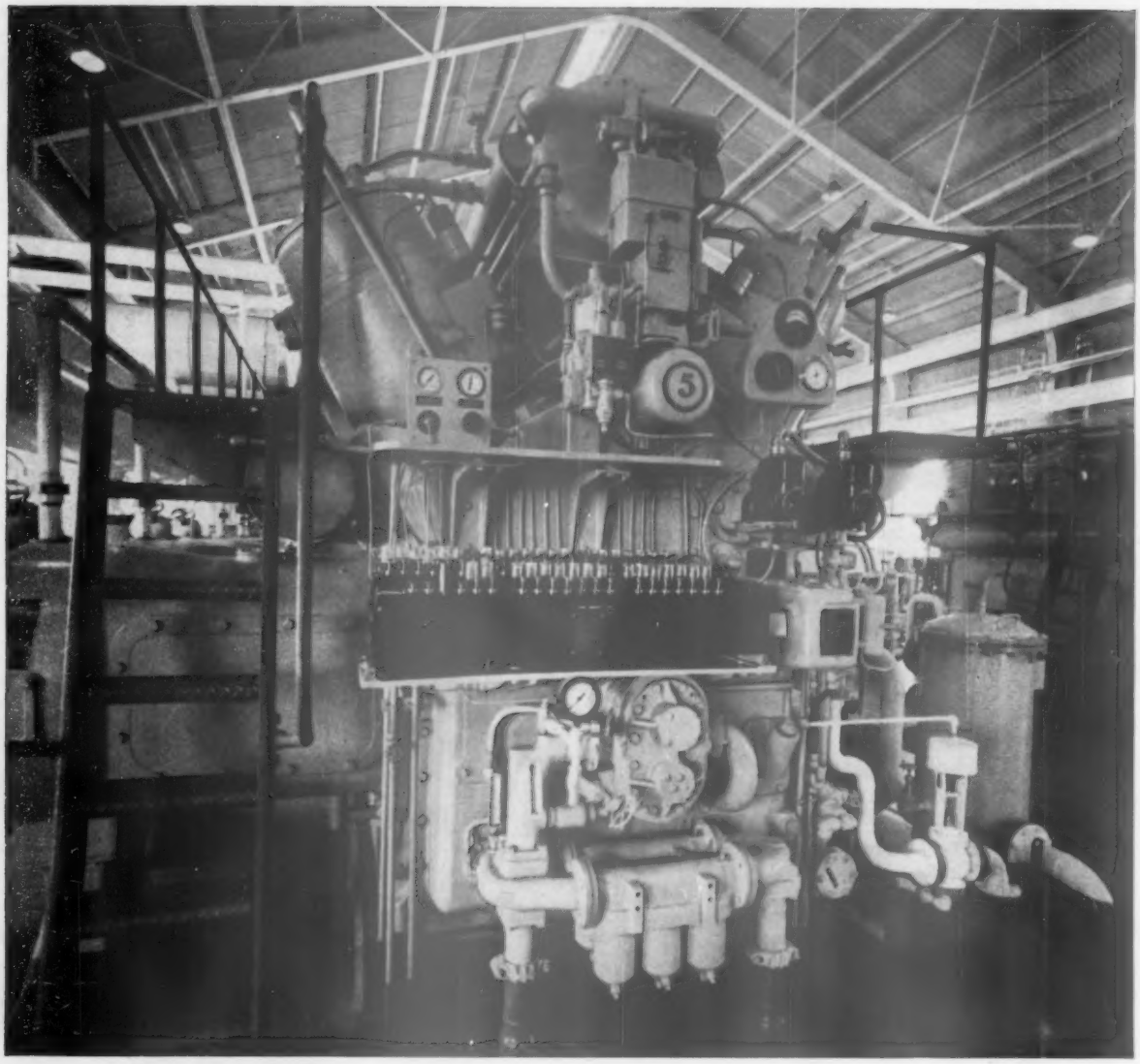


BENDIX MAGNETOS SPARK COOPER-BESSEMER ENGINES FOR EL PASO NATURAL GAS

Once again, Bendix* ignition equipment is proving its worth to the petroleum and natural gas industries. Shown here is a Bendix LAR magneto and Hi-V transformer coil installation at El Paso Natural Gas Company's Blanco Station in San Juan County, New Mexico. El Paso uses eight 1350 hp. Cooper-Bessemer gas compressors, all equipped with Bendix magnetos, at its mainline gas booster station.

Bendix LAR magnetos deliver dependable ignition at the lowest practicable cost. Even under the most adverse operating conditions, their reserve power ensures smooth engine performance. The Bendix LAR magneto and Hi-V transformer coil form a matched ignition system to handle rugged engine requirements.

LA magnetos now in service can easily be converted to the modern Bendix LAR type with conversion kits now available. They can be obtained from your Bendix ignition distributor or from the factory. For complete details, write SCINTILLA DIVISION OF THE BENDIX CORPORATION, Sidney, New York.

*REG. TRADEMARK

Scintilla Division
SIDNEY, N. Y.

THE Bendix CORPORATION

Rugged joint of Extreme Line tubing permits repeated make-up and breaking out without galling. Operators like the fast make-up that results from the integral design.

Why operators prefer SPANG Extreme Line Tubing

Streamlined design of integral joint SPANG Extreme Line tubing eliminates the need for couplings. The high strength joint provides a metal-to-metal seal that resists leakage in the deepest, high pressure wells.

Extreme Line joints are streamlined internally and externally, minimizing possibility of hanging up or stripping under pressure. Integral joint eliminates 50% of the threaded connections in conventional designs.

Wide, heavy, modified Acme threads speed joint make-up with minimum chance of cross-threading.

SPANG Extreme Line tubing is readily available in grades J-55, N-80 and P-105. It rounds out National Supply's complete tubing line for every specific application. Call your National Supply representative for complete information, or write to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.

See next pages for more information on Spang tubular products

Why SPANG Extreme Line Casing out-performs other casing in deep, high pressure wells

Unique metal-to-metal seal makes SPANG Extreme Line casing 100% leak resistant. Precision machined seals on box and pin ends of the casing bear up under the heaviest loads in tension and compression.

Integral joint eliminates couplings. The joint design provides greater strength with considerable reduction in diameter.

Cross threading is practically impossible. Any initial misalignment is automatically corrected by the broad, flat-crested threads which guide the pin quickly into positive engagement with the box.

Extreme Line casing can be re-run many times without galling. The sturdy, Acme-type threads afford higher recovery than API casing, without rethreading.

This advanced design reduces the number of threaded connections to one-half those required with T&C casing, as the coupling element is an integral part of the casing.

Extreme Line casing is available in Grades J-55, N-80 and P-110. Your National Supply representative will be happy to discuss the basic advantages of this casing with you. Or you can get complete details by writing to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.

Extreme Line casing is just part of the National Supply complete line of oil country tubular products. Spang drill pipe and National drill collars were also used in this Louisiana well.

Why SPANG Drill Pipe and Tool Joints are the logical choice for your drilling program

SPANG drill pipe is specifically engineered to minimize leakage, fatigue, tension and corrosion. Operators have found they can depend on it for fast, dependable performance. There is also an advantage in the fact that National Supply is the only company that manufactures both drill pipe and tool joints.

Spangweld drill pipe and tool joints provide fast, dependable operation. The tool joints are welded to the drill pipe by an automatically controlled operation that insures accurate alignment and a high quality weld. Welding permits a streamlined contour and a reduced number of threaded elements. This tool joint connection also allows a small O.D. and maximum bore — a definite advantage for slim hole drilling.

Another field-proven SPANG drill pipe product is the Double Seal Shrink Thread tool joint. This joint is designed with two distinct seal areas — one internal and one external. The threads have no sealing function to perform. The two sealing surfaces and the shrink thread design result in a joint that is leakproof and minimizes possibility of washout. The tool joints can be removed and replaced easily in the field.

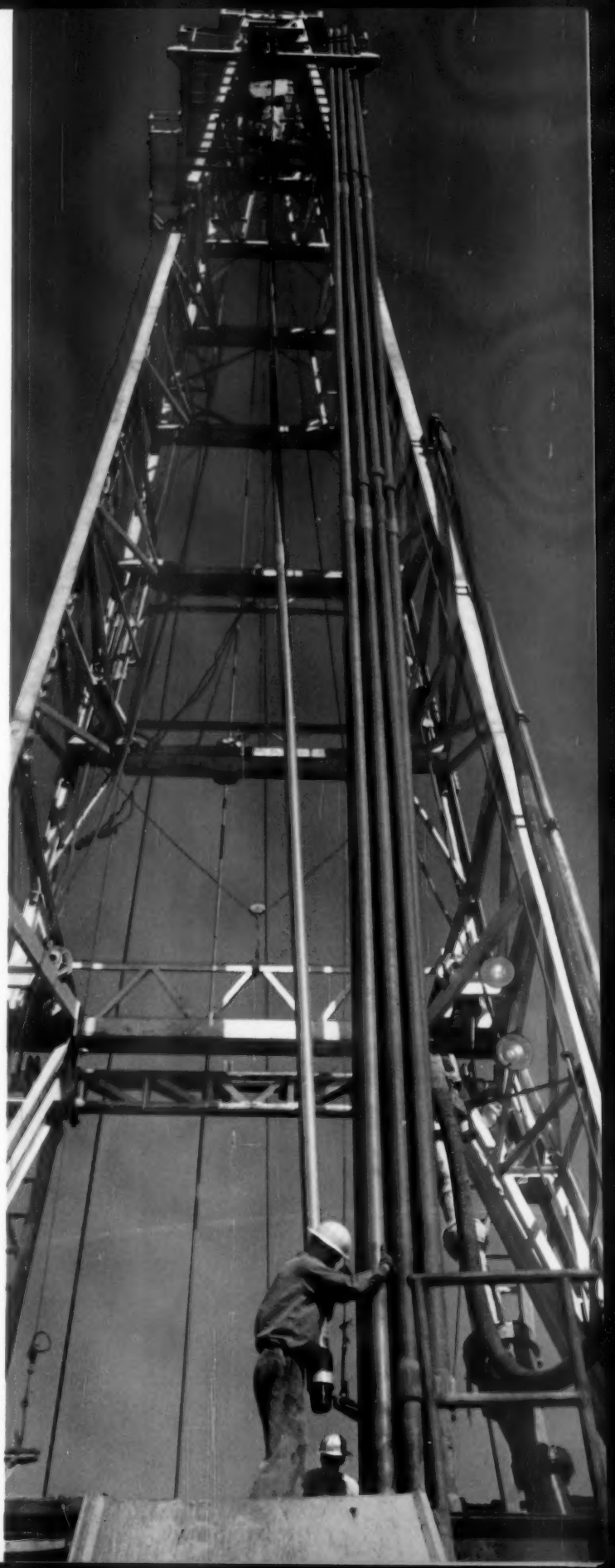
Both of these drill pipe products are available with SPANG Hardfacing, a superior protection for tool joints in abrasive formations. It consists of multiple bands of tungsten carbide, continuously over-lapped on the joint to form a solid particle-to-metal band.

SPANG drill pipe is readily available in every diameter and type now in use. Consult your National Supply representative for details, or write direct to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.

Spang drill pipe is field-proven in the toughest oil country applications. It is available in a full range of sizes.

Steel

Steel's Symbol of strength, long life, and economy



This Spang CW pipe is used in gathering lines in this California operation. The pipe has wide application in gas, oil and water gathering lines.

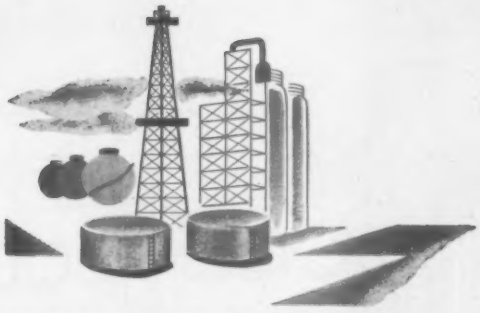
MOST DEPENDABLE STANDARD PIPE IN THE WORLD... SPANG CW Pipe

Superiority of SPANG CW steel pipe is due to the strictest possible quality control in every manufacturing step. This quality control pays off in uniformity and dependability.

Every length of SPANG pipe is hydrostatically tested and inspected for thread quality. The uniformity of this pipe can save you many hours in laying gathering and feeding lines. And most important, there is no premium price for SPANG quality. All sizes, plain end or threaded and coupled, are available now.

Next time you buy pipe, call your National Supply store. You'll find the pipe is easy to cut, bend, thread and weld. For name of your closest source of supply, just write to National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.

ARMCO National Supply Division



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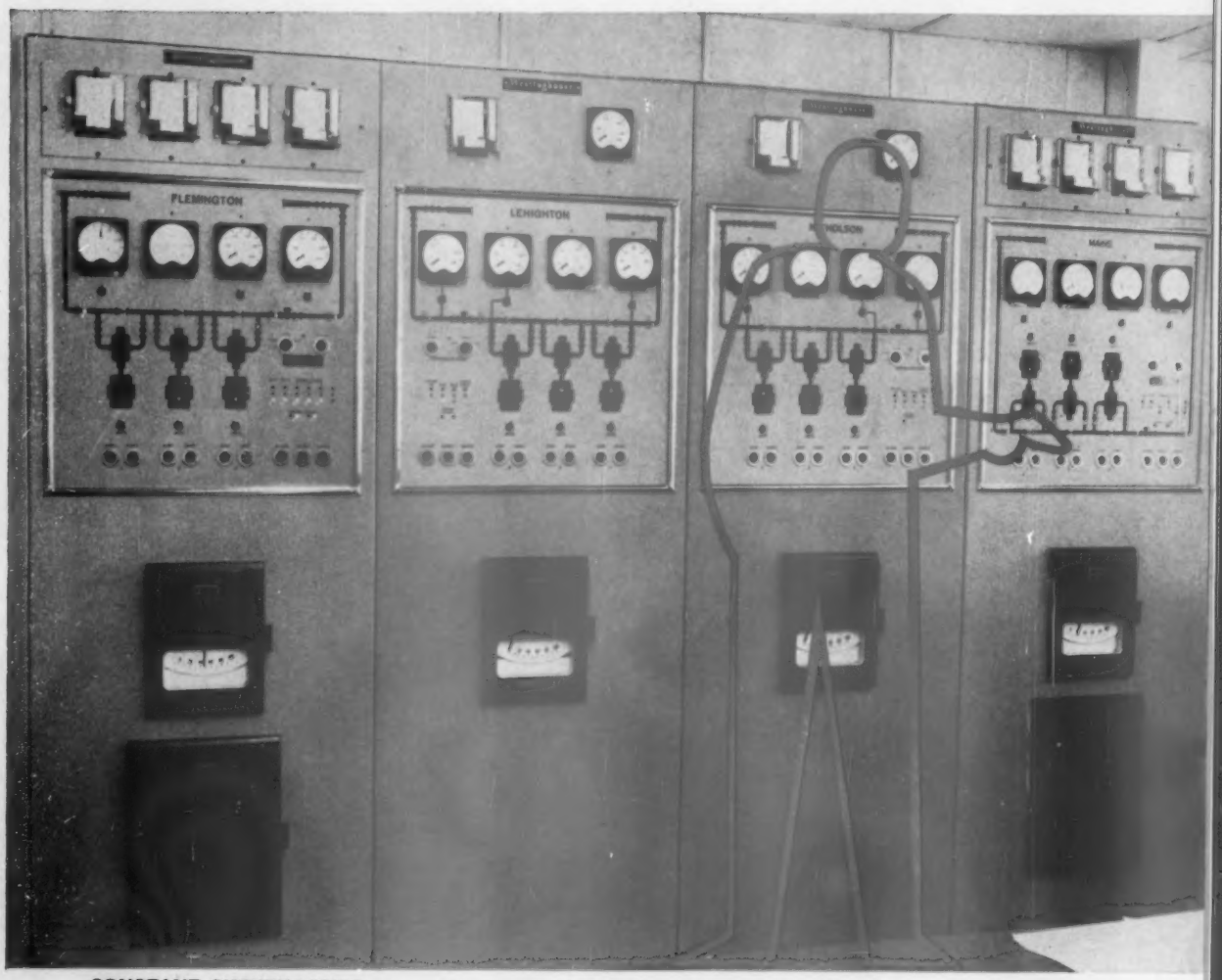
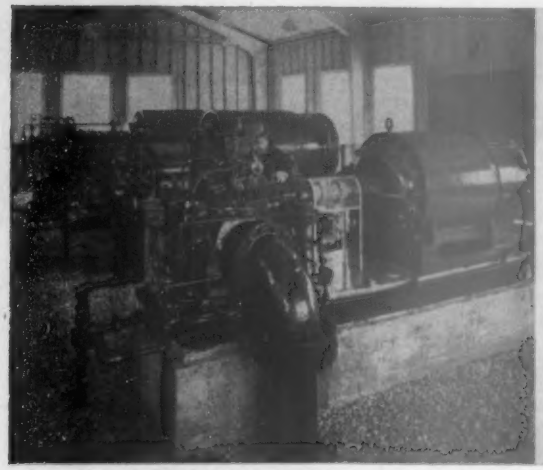
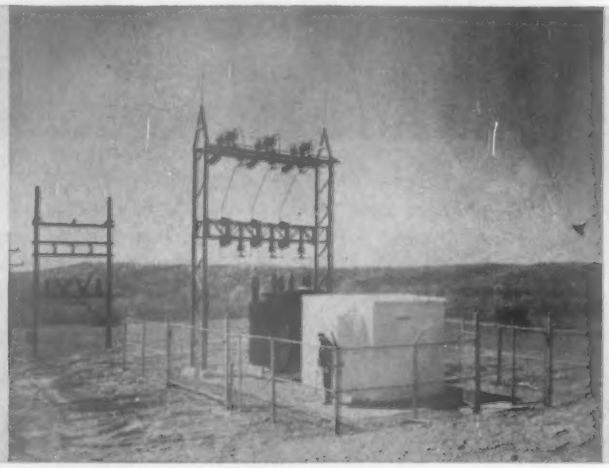


CONSTANT SURVEILLANCE of operations at Buckeye's automated booster station is maintained by a Westinghouse control system. Indicator lights alert the dispatcher in Macungie, Pa., of any equipment trouble.



"NO MAJOR REPAIRS in 10 years." That's Buckeye's forecast for the huge, explosion-proof Westinghouse pump motors at the heart of Buckeye Pipe Line's new, remotely controlled booster station. Electrically powered stations like this Westinghouse-equipped installation at Maine, N.Y., are in sharp contrast to older, steam-operated stations needing 14 men around the clock.



"BEST POSSIBLE DESIGN" is Buckeye's opinion of 2000-kva Westinghouse transformer which steps incoming 34,400-volt power down to 2300 volts. Highly efficient operation was achieved after computer evaluated all possible design variables. Transformer's Insuldur® insulation system permits overloads with no reduction in service life.

WESTINGHOUSE AUTOMATES BUCKEYE PIPE LINE'S NEW 120,000-BARREL BOOSTER STATION FOR REMOTE CONTROL

A dispatcher in Macungie, Pa., can completely control operations at Buckeye Pipe Line Company's new booster station 200 miles away, at Maine, N.Y. The Westinghouse-equipped station was built to step up Buckeye's capacity from 80,000 barrels per day to 120,000 barrels per day. The installation is the newest of five booster stations along a 14-inch pipeline that delivers refined oil products for 14 oil companies located from Linden, N.J., to Buffalo, N.Y. The Buckeye booster station at Maine represents the latest advances in pipeline automation.

"The station," reports the station foreman, "is seldom attended in person . . . and then by only one man. From the power transformer, switchgear and fault detection system to the electric pump motors, Westinghouse equipment enables our Allentown dispatcher to control pumps at the station, and learn from remote recording instruments the operating conditions of any one of the three motors, as well as the emergency shutoff valves. Any emergency warning lights that flash in the station will also flash in Macungie so that the dispatcher always knows whether everything is in proper working order."

The three 2300-volt Westinghouse pump motors provide 500 hp, 600 hp and 700 hp for pumping gasoline and heating oil. Pump power is converted to 2300 volts from an incoming 34,400 volts by a 2000-kva, oil-filled, outdoor Westinghouse transformer. A smaller service transformer, rated 75 kva, supplies power for lighting and auxiliary equipment.

To aid pipeline operators in achieving more efficient, cost-saving distribution, Westinghouse offers a long-term, step-by-step plan leading to economical automatic operation. It is called *Progressive Automation*. For more facts about *Progressive Automation*—call your closest Westinghouse representative. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania. *You can be sure . . . if it's Westinghouse.* J-96157

Westinghouse

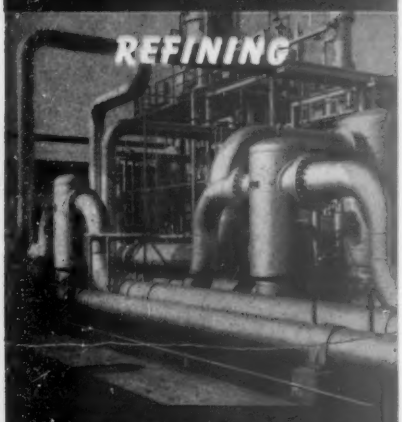
RELIABLE CIRCUIT PROTECTION for station's electrical system is provided by Westinghouse metal-clad switchgear. Maintenance is facilitated by use of horizontal drawout-type DH magnetic air circuit breaker. Switchgear can be remotely or locally operated.

ADEQUATE POWER AND PROTECTION for supervisory controls, lighting and auxiliary station equipment are supplied by Westinghouse control center. Center is composed of interchangeable, space-saving, easily installed modular units.

PRODUCTION

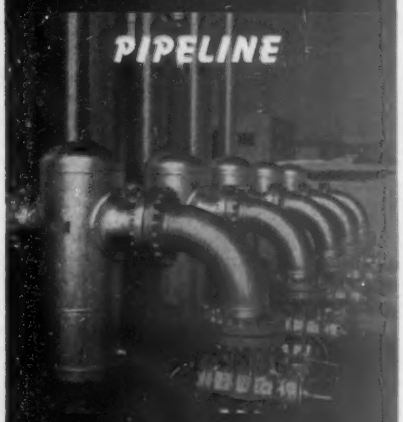
Pictured above is a Peerless Line Separator removing moisture from fuel to drilling rig.

REFINING



These two Peerless Line Separators are doing an efficient job of mist extraction in the Petrochemical plant in Kentucky.

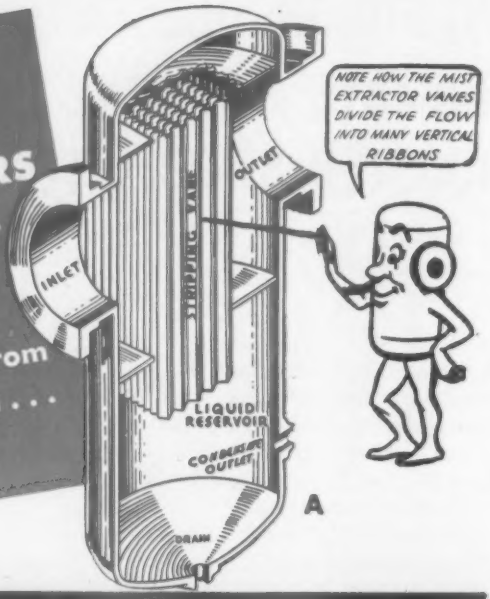
PIPELINE

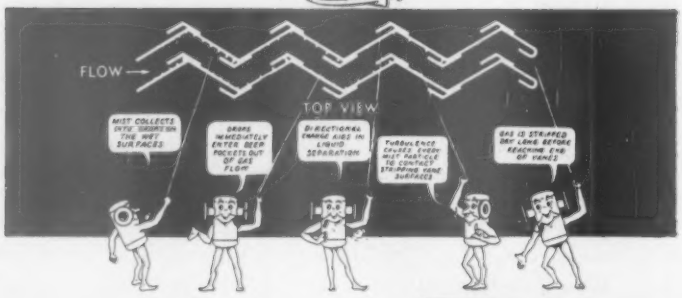


FIVE Peerless Line Separators are shown above as they handle carry over from large scrubbers.

PEERLESS LINE SEPARATORS

Outstanding for the efficient extraction of liquid mist from gas or steam . . .




B
FLOW
TOP VIEW
MIST COLLECTS INTO DROPLETS ON THE WET SURFACES
DROPS IMMEDIATELY ENTER DEEP POCKETS OUT OF GAS FLOW
BI-DIRECTIONAL CHANGE AIDS IN LIQUID SEPARATION
TURBULENCE CAUSES EVERY MIST PARTICLE TO CONTACT STOPPING VANE SURFACES
GAS IS STRIPPED DRY LONG BEFORE REACHING END OF VANES

HIGH EFFICIENCY—HIGH CAPACITY LOW PRESSURE DROP

Thousands of installations throughout the oil industry . . . production, pipeline, refining and petrochemical . . . prove the Peerless Line Separator principle to be one of the most outstanding methods available for the extraction of liquid gas, steam or air.

Drawing A above shows the arrangement of the vanes in the Separator. Drawing B is an illustration of the Peerless Principle.

The mist extractor combines the forces of impingement, centrifugal motion and surface tension to obtain its high efficiency. The path of the gas, etc., through the unit is constantly bending causing semi-violent turbulence and rolling of the gas against the walls of the vane. Impingement and centrifugal force combine to contact the droplets with the vanes, where they coalesce, and surface tension then causes them to cling to the vane's surfaces. Gravity and the impact of the gas steam then drive the droplets into the pockets where they roll down the vanes and out of the gas stream.

Through the Peerless method of mist extraction, the gas is stripped dry long before reaching the end of the vanes.

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For any capacity
For any working pressure
For corrosive conditions
With removable vane units
With extra body length
With connections for accessory equipment
For pressure drop requirements of less than 6" water
For any vapor-liquid ratio
For any piping requirement

SPECIAL DESIGN SEPARATORS FOR ANY REQUIREMENT

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the Fisher type 1664

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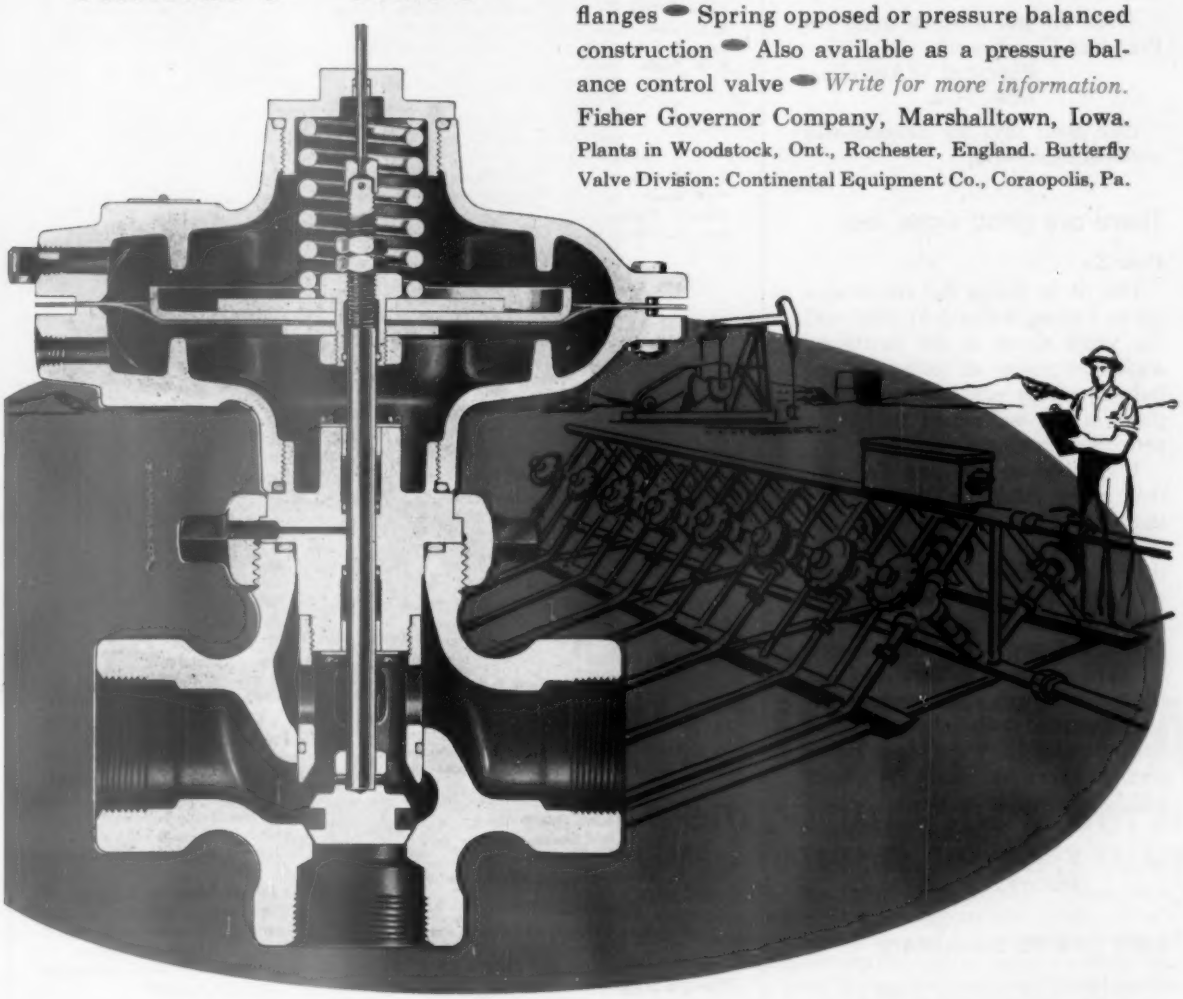
Fisher Governor Company, Marshalltown, Iowa.
Plants in Woodstock, Ont., Rochester, England. Butterfly Valve Division: Continental Equipment Co., Coraopolis, Pa.



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They Say—

A familiar face

Dear Sir:

My concern over what Richard M. Nixon was going to do for a living having lost the election was relieved by the cover of your January 16, 1961, issue which shows him happily tending a pipeline in Libya, sporting a handsome new beard.

What do you have in mind for President Eisenhower?

Raymond D'Argenio
New York

Our artist says the likeness was unintentional.—Ed.

There are good signs, too

Dear Sir:

One of the things that encourages me in looking forward to 1961 and the years ahead is the growing awareness among all sections of our industry of the vital part marketing plays in the welfare of the whole petroleum business.

It is clear to me, and I'm sure that many others in the industry share the same feeling, that much of this improved understanding is the direct result of the distinguished editorials published in recent months by The Oil and Gas Journal.

Our industry is fortunate indeed to have responsible, forward-looking trade journals such as yours that are concerned with helping develop new attitudes that will keep in better perspective the many problems which continue to plague us.

W. C. Norman, President
Colorado Oil & Gas Corp.
Denver

Let's talk to consumers

Dear Sir:

If congressional foes of such vital legislation as the depletion allowance and a workable natural-gas act are successful in their efforts, our industry will have no one to blame but itself.

We continually and eloquently outline the need for such laws to each other in a multitude of trade

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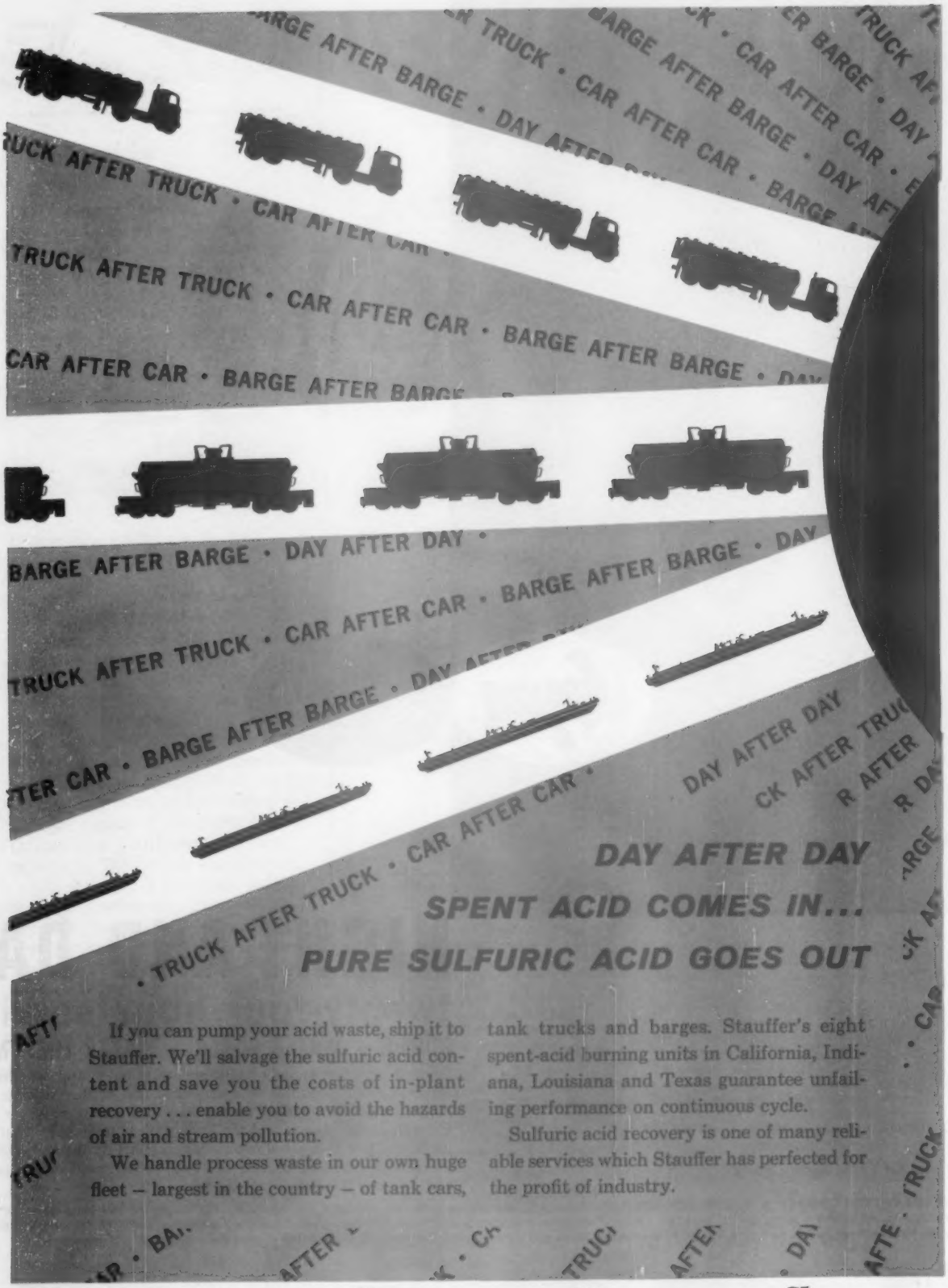
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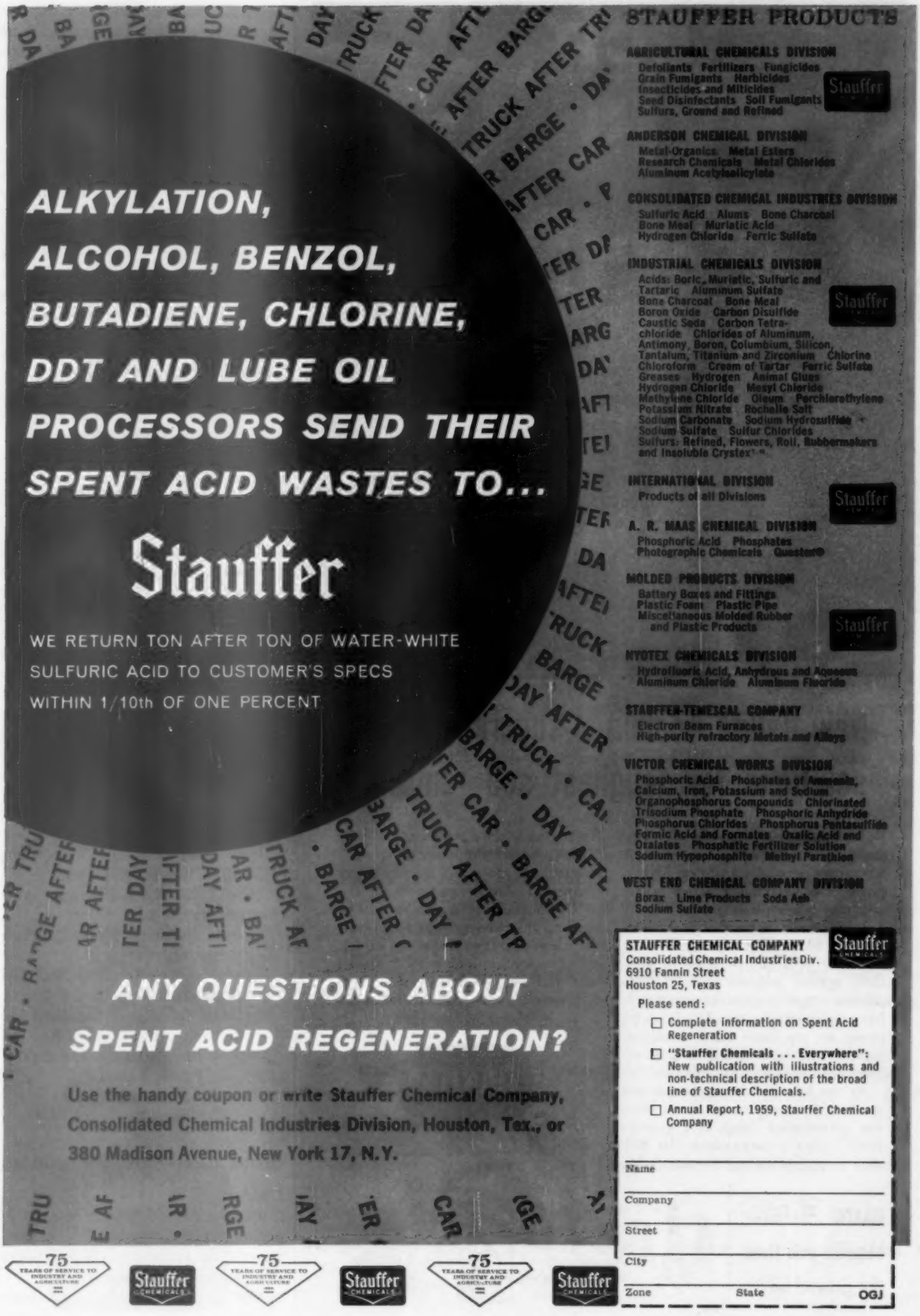
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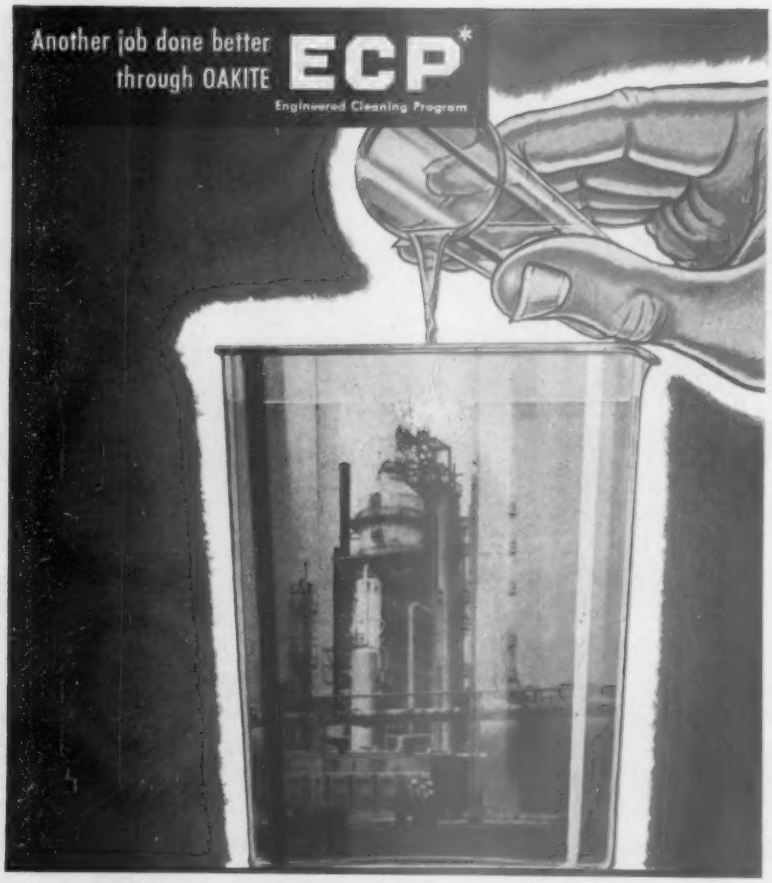

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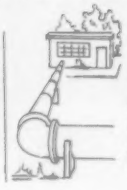


it restores pipeline efficiency through chemical cleaning... it simplifies pump station housekeeping

journals, papers, and speeches, but consistently fail to present the facts to the consuming (i.e., voting) public.

If the constituents of the industry's legislative enemies were aware of the truth and how **their** best interests are served by an adequate depletion allowance and a minimum of government control in a highly competitive industry, our basic problem would be solved.

The average consumer cares little about corporate profit margins or exploratory incentives, but he has an abiding interest in his pocketbook and the comforts and conveniences supplied by a healthy petroleum industry. Let's get the story to these people.

J. V. Pollock
Signal Oil & Gas
Midland, Tex.

Amoco is on the toll roads

Dear Sir:

I have just noted that in the December 12, 1960, issue of The Oil and Gas Journal ("New Toll Roads Are Attracting Marketers," p. 80) American Oil Co. and Standard Oil division of American Oil Co. service stations are omitted in your listing of outlets and marketers on toll roads.

To complete the record, please note the following outlets of our company and the locations:

New York Berkshire Spur, New York-Massachusetts Thruway: American Oil 2.
New York Southern State Parkway: American Oil 3.
New York Ocean Parkway: American Oil 1.
Florida Sunshine Parkway: American Oil 1.
Illinois Turnpike: Standard Oil division, American Oil 10.
Indiana Toll Road: Standard Oil division, American Oil 8.

Jim Patterson, Director
Public Relations
American Oil Co.
Chicago

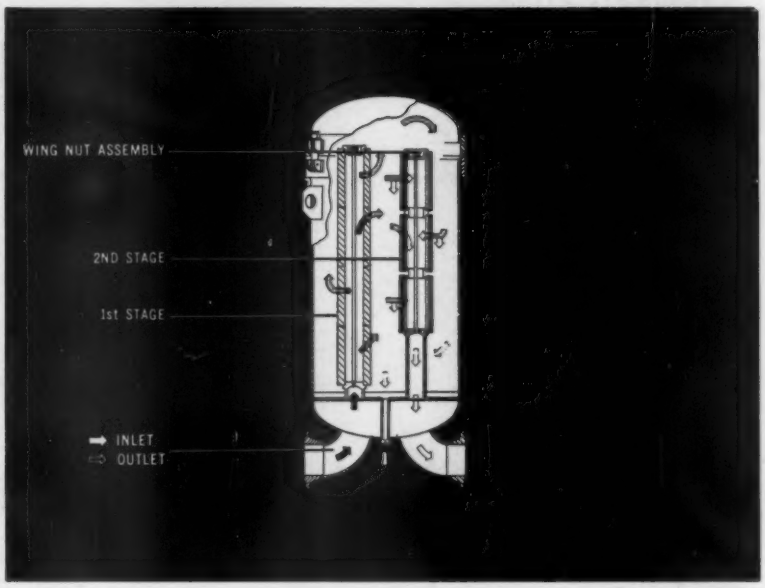
State costs must be studied

Dear Sir:

I earnestly solicit your support in accomplishing the aims and purposes of Oklahoma Independent Petroleum Association.

Ours is a state in which one single

specify FRAM-WARNER LEWIS EQUIPMENT



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1st Stage (coalescing-filtering) cartridges remove solids such as dirt, rust and scale and breaks up mechanical emulsions. Finely dispersed water droplets gather together into large water droplets and fall by gravity into the water-collecting sump.

2nd Stage (separating) cartridges are chemically-treated media which completely blocks passage of water yet permits passage of product through cartridges to the outlet.

Two stage design provides positive protection against contaminated products not possible in single stage designs. Replacement cartridges are easily installed and inexpensive.

Write Process Department, Warner Lewis Company for details.

WARNER LEWIS COMPANY
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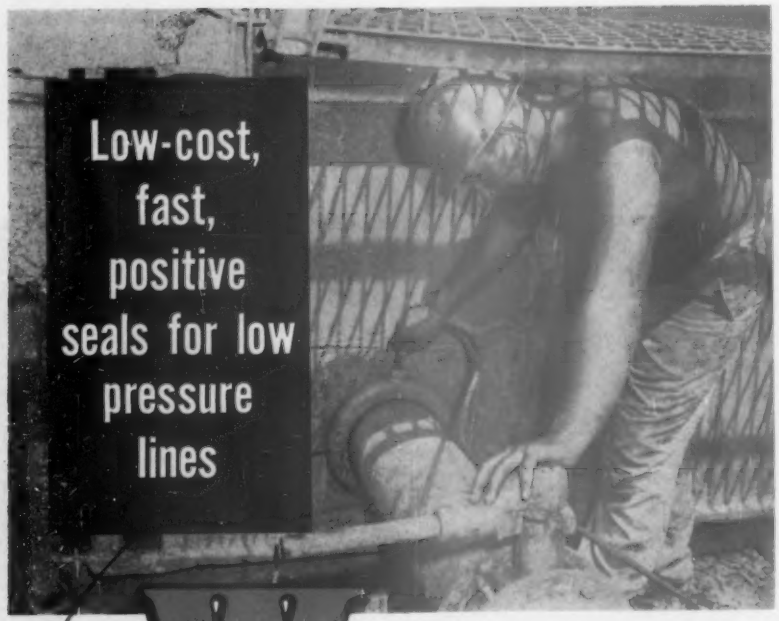

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HOUSTON, TEXAS
Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION
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industry (petroleum) provides approximately 70% of the revenue that it takes to operate the state government. Practically every business in Oklahoma is either directly or indirectly affected by the progress of the petroleum industry.

It is imperative that the cost of operating the state be examined carefully and that it be determined whether or not costs can be reduced to prevent higher taxes.

To accomplish any degree of success, it will take the cooperation of all of the people in the state. Today, more than ever before, the major petroleum companies and the independents need to join hands and work closely for a common cause.

E. A. Smith, President
Oklahoma Independent
Petroleum Association

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR

FEBRUARY

6-8 Missouri Petroleum Association, convention, Muehlebach Hotel, Kansas City.

7 Petroleum Equipment Suppliers Association, Gulf Coast district meeting, Shamrock-Hilton Hotel, Houston.

7-8 University of Oklahoma, School of Petroleum Engineering, advanced petroleum engineer seminar, University of Oklahoma, Norman.

8-10 Southwestern Legal Foundation, twelfth annual institute on the law of oil, gas, and taxation, Southwestern Legal Center, Dallas.

9-10 API Committee on Public Affairs, New Orleans regional conference on employe communications, Roosevelt Hotel, New Orleans.

9-11 National Society of Professional Engineers, winter meeting, Hotel Fort Des Moines, Des Moines, Iowa.

14 Petroleum Equipment Suppliers Association, eastern district meeting, Duquesne Club, Pittsburgh.

14-15 National Association of Corrosion Engineers, Shreveport, La., section, short course, Centenary College, Shreveport.

15-16 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Rice Hotel, Houston.

16 API Committee on Public Affairs, Dallas regional conference on employe communications, Sheraton-Dallas Hotel, Dallas.

18 Purdue University, business history conference, "Management Decisions Under Government Regulation," Memorial Union, Purdue University, Lafayette, Ind.

20-Mar. 11 Advanced Drilling Practices Course for Engineers, University of Oklahoma, Norman.

23-24 Oklahoma State University, natural gas conference, Stillwater, Okla.

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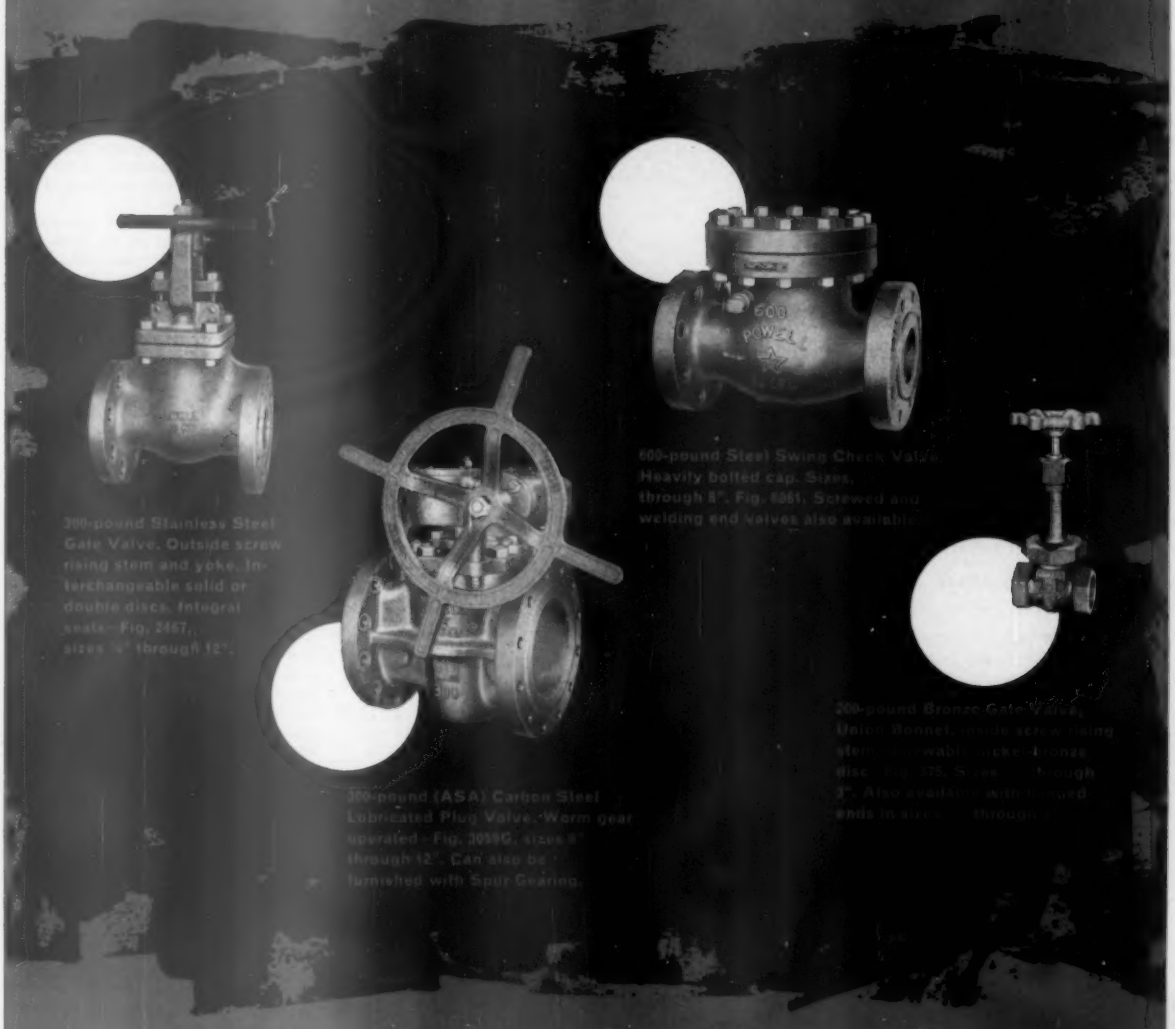
OIL—nature's gift to man out of the earth—transformed into the modern lifeline of the free world, for peace, power, and products.

And Powell has supplied the vital valves to the petroleum industry for over a century. There is a Powell valve to cover every need in oil refineries, petrochemical plants, and storage facilities everywhere.

Contact your nearest Powell valve distributor or The Wm. Powell Company directly. And if you have a special problem, Powell will make an analysis of your petroleum flow control conditions and submit recommendations. Let Powell's 115 years of industrial valve manufacturing experience go to work for you!



300-pound Stainless Steel Gate Valve. Outside screw rising stem and yoke. Interchangeable solid or double discs. Integral seats—Fig. 2467, sizes ½" through 12".

600-pound Steel Swing Check Valve. Heavily bolted cap. Sizes through 8". Fig. 6061. Screwed and welding end valves also available.

300-pound (ASA) Carbon Steel Lubricated Plug Valve. Worm gear operated—Fig. 3039G, sizes 6" through 12". Can also be furnished with Spur Gearing.

300-pound Bronze Gate Valve. Union Bonnet. Outside screw rising stem. Renewable bronze disc. Fig. 439. Sizes ¼" through 2". Also available with screwed ends in sizes through 1".

115th year of manufacturing industrial valves for the free world

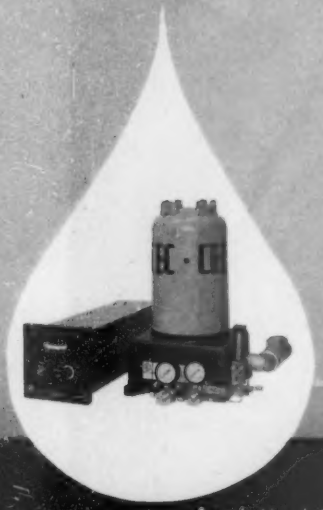
POWELL PETROLEUM VALVES

THE WM. POWELL COMPANY CINCINNATI 22, OHIO

WHERE WOULD YOU USE THIS LIQUID PROCESS MOISTURE MONITOR?

Here, undergoing its final quality control checkout, is another CEC 26-312 Liquid Process Moisture Monitor. Where it goes from here depends on you.

The 26-312 will go anywhere you need it – even in hazardous locations – for continuous measurement of trace water, from 1-1000 ppm, in any liquid of .75 to 1.5 gm/cc density.



Its 63% response in just 90 seconds, with an accuracy of 10% of full scale on any range, means you can quickly measure water in such liquids as JP-4 and JP-5 jet fuel... naphtha... xylene reformer feed stocks...F-11 and F-113 refrigerants... metal cleaning system solvents... dielectric and hydraulic aromatics... most halogenated hydrocarbon liquids...and in many polymers having moderate viscosities.

Where would *you* install the 26-312?

For more information, write for Bulletin CEC 26312-X7 or call your nearest CEC sales and service office.

Analytical & Control Division CEC

CONSOLIDATED ELECTRODYNAMICS / pasadena, california

A SUBSIDIARY OF Bell & Howell · FINER PRODUCTS THROUGH IMAGINATION

23-24 Chemical Institute of Canada, conference of the protective coatings division: Toronto, Feb. 23; Montreal, Feb. 24.

24 Natural Gasoline Association of America, South Louisiana regional meeting, Lafayette Petroleum Club, Lafayette, La.

26-Mar. 1 American Institute of Chemical Engineers, petrochemical and refining exposition, Municipal Auditorium, New Orleans, and national meeting, Hotel Roosevelt, New Orleans.

26-Mar. 2 American Institute of Mining, Metallurgical, and Petroleum Engineers annual meeting, Chase and Park Plaza Hotels, St. Louis.

27 Canadian Society of Exploration Geophysicists, conference on exploration geophysics—today and tomorrow, Palliser Hotel, Calgary.

28-Mar. 1 API Committee on Public Affairs, New York regional conference on employe communications, Park-Sheraton Hotel, New York City.

MARCH

2 Petroleum Equipment Suppliers Association, north Mid-Continent district meeting, Mayo Hotel, Tulsa.

3 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus.

3 Southern Gas Association, transmission section, annual spring management conference, Sheraton-Dallas Hotel, Dallas.

5-9 American Society of Mechanical Engineers, gas-turbine power division, and U. S. Department of Defense, annual gas-turbine conference and products show, Shoreham Hotel, Washington.

7 Petroleum Equipment Suppliers Association, Pacific district meeting, Ambassador Hotel, Los Angeles.

7-8 University of Oklahoma, School of Geological Engineering, seventh biennial geological symposium, Student Union Building, University of Oklahoma, Norman.

8-9 API Committee on Public Affairs, Chicago regional conference on employe communications, Sheraton-Towers Hotel, Chicago.

8-10 American Petroleum Institute, Division of Production, southern district meeting, Captain Shreve and Washington-Youree hotels, Shreveport, La.

13-16 Kentucky Petroleum Marketers Association, sixth management institute, conducted by the University of Louisville, Brown Hotel, Louisville.

13-17 National Association of Corrosion Engineers, annual meeting and corrosion show, Hotel Statler, Buffalo, N. Y.

15-17 Natural Gasoline Association of America, annual convention, Baker Hotel, Dallas.

16-17 International Oil and Gas Educational Center, study of the economics of petroleum exploration, development, and property valuation, Southwestern Legal Center, Dallas.

20 American Gas Association, general management section conference, Francis Marion Hotel, Charleston, S. C.

21-23 American Power Conference, twenty-third meeting, Sherman Hotel, Chicago.

21-30 American Chemical Society, 139th annual meeting, Kiel Auditorium, St. Louis.

22 American Institute of Chemical Engineers, Chicago section, symposium on new developments for chemical

processing and new developments for the engineer and management, Conrad Hilton Hotel, Chicago.

22-24 American Petroleum Institute, Division of Production, southwestern district meeting, Cole Hotel, Albuquerque.

23 National Industrial Conference Board, general session, Shamrock-Hilton Hotel, Houston.

23-24 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

27-28 University of Wichita, School of Engineering, third annual production institute, university campus, Wichita.

27-29 Midwest Gas Association, annual meeting and convention, Sheraton-Fontenelle Hotel, Omaha.

27-31 Instrument Society of America, symposium on temperature measurement and control in science and industry, Veterans Memorial Auditorium, Columbus, Ohio.

28-29 University of Oklahoma, Schools of Petroleum and Gas Engineering, gas conditioning short course, Oklahoma Memorial Union Building, University of Oklahoma, Norman.

APRIL

4 Instrument Society of America, New Jersey section, annual symposium on electronic process instrumentation, Hotel Essex House, Newark, N. J.

4-5 University of Kansas, gas compressor institute, Liberal, Kans.

5-6 Third annual symposium on pilot plant and process automation, Ambassador Hotel, Los Angeles.

5-7 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Mayo Hotel, Tulsa.

6-7 University of Oklahoma, School of Mechanical Engineering, short course on industrial engines, University of Oklahoma, Norman.

6-8 Texas Oil Jobbers Association, Petroleum Marketers Association, convention and trade show, Baker Hotel, Dallas.

7-9 American Institute of Mining, Metallurgical, and Petroleum Engineers, Southwestern Alaska Chapter, sixth annual mining, minerals, and petroleum conference, Anchorage, Alaska.

10-11 American Society of Mechanical Engineers, maintenance and plant engineering conference, Bancroft Hotel, Worcester, Mass.

10-12 Western Petroleum Refiners Association, annual meeting, Granada Hotel, San Antonio, Tex.

10-13 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Jung Hotel, New Orleans.

11-13 Petroleum Industry Electrical Association and Petroleum Electric Supply Association, annual conference, Moody Convention Center, Galveston, Tex.

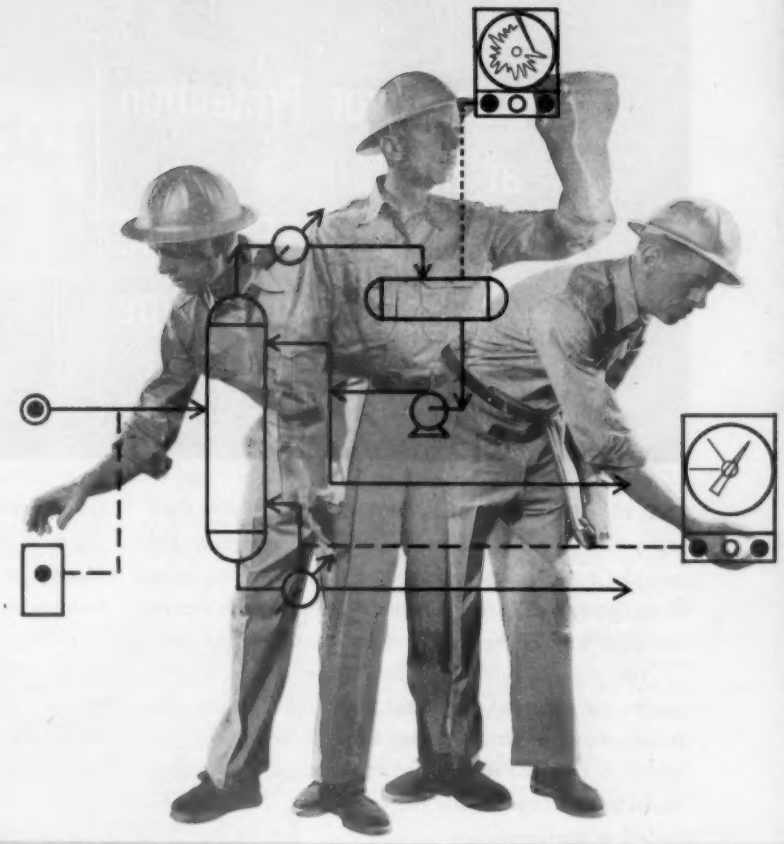
17-19 Instrument Society of America, symposium on instrumental methods of analysis, Shamrock-Hilton Hotel, Houston.

18-20 University of Oklahoma, southwestern gas measurement short course, North Campus, University of Oklahoma, Norman.

19 University of Tulsa, fifteenth annual conference of accountants, University campus, Tulsa.

19-20 National Petroleum Association, semi-annual meeting, Hotel Sheraton-Cleveland, Cleveland.

20-21 Society of Petroleum Engineers of AIME, East Texas-Louisiana-Arkansas gas-technology symposium, Tyler, Tex.

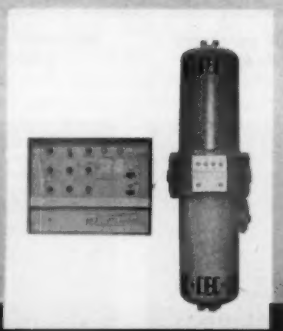


Control problems on your hands?

CEC's Chromatographic closed-loop control instrumentation is available for virtually every plant and process

Now you can replace manual set-point control with a chromatographic closed-loop control package that matches the pneumatic, electronic or computer control system in your plant. These control packages, built around the 26-212 High-Speed Process Chromatograph, can be constructed from off-the-shelf modules for every type of control... or custom engineered for special applications. CEC's foremost engineering background in chromatographic control guarantees a package compatible with your system.

The 26-212 Process Chromatograph makes it possible. **High speed and flexible design are keys to the 26-212's excellence for process control. Accurate analyses are produced in 1/20th to 1/50th the time of other instruments. This permits precise control of rapidly changing processes. An integral electronics patchboard facilitates tailoring of the instrument to specific applications – actually permits instrument modifications and system redesign by plant personnel. In addition, the 26-212 provides continuous, maintenance-free operation.** ***For a complete description of the 26-212's features and CEC's closed-loop control capabilities, write for Bulletin CEC 1860-X9 or call your nearest CEC sales and service office.***



Analytical & Control Division CEC

CONSOLIDATED ELECTRODYNAMICS / pasadena, california

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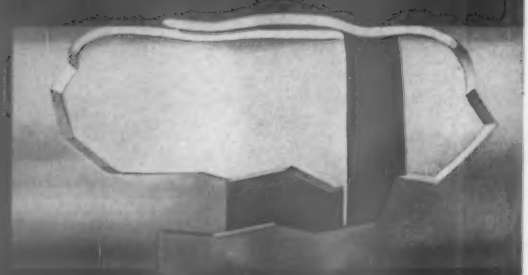
Get Corrosion Protection at the Joint Internally with TEX-TUBE Epoxy-Joined Pipe



Radically new TEX-TUBE EPOXY-JOINED steel pipe eliminates costly, time-consuming welding operations and provides a rapid, low-cost method of joining line pipe. *More importantly,* it finally provides the answer to joining line pipe without the danger of corrosion at every joint.

The pipe is flared to a bell shape on one end to receive the plain end of another pipe length. Contact surfaces are coated with an epoxy adhesive before they are joined. A patented tool then crimps the joint, providing mechanical strength while the epoxy sets. The pipe can be laid immediately.

Field tests over a 12-month period have proved the advantages of this new method. It has joined line pipe rapidly and permanently, providing a plastic-lined joint that *prevented internal joint corrosion.* The high-strength, lightwall pipe has substantially reduced material costs. Installation time and costs have also been reduced because welding operations were eliminated.

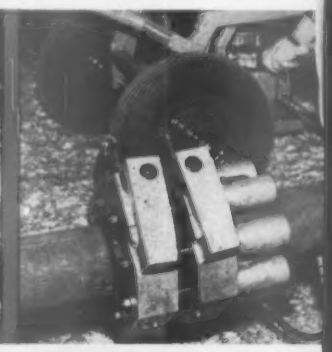
Recently TEX-TUBE EPOXY-JOINED pipe was used to lay a 20,000-foot, 4-inch gas line. Pipe costs were 58 per cent lower than the cost of conventional pipe. Installation costs were also reduced 25 per cent and installation time was about half that required for welded-joint pipe.

Tex-Tube manufactures the new pipe in sizes from 1½ to 4½ inches. Present test pressures are 1200 psi for pipe from 1½ through 3½ inches and 800 psi for larger pipe. Research is expected to increase future joint test pressures to the strength of the pipe.

First the plain-pipe end is coated with epoxy adhesive.

Next the inside of the bell-shaped end is coated with epoxy.

The hydraulic crimping tool is then placed around the joint.



Crimping holds joint firmly while epoxy sets. Pipe can be laid immediately.

Special interest to those engaged in water-flooding and re-pressurizing operations:

The costly and time-consuming line pipe maintenance problems connected with flooding and re-pressurizing can now be substantially reduced with Tex-Tube Epoxy-Joined pipe. Ask your Tex-Tube representative about this special use of epoxy-joined pipe, or write Tex-Tube, Inc., 1503 North Post Oak Road, Houston, Texas.

TEX-TUBE, INC.

1503 NORTH POST OAK ROAD • HOUSTON, TEXAS
Sales Offices in Midland, Dallas, Amarillo, Tulsa, Los Angeles and Pensacola

PIPE MANUFACTURERS
High Tensile Lightwall Pipe
Oil Well Casing
Oil Well Tubing
Structural and Mechanical Tubing
Shot Hole Casing
Upsetting, Threading, Normalizing

DISTRIBUTORS
Oil Country Goods
Line Pipe
Refinery and Chemical Plant Piping

50 years ago

February 9, 1911

So much explosive material is being called for in construction of the Panama Canal that the oil industry is being faced with an acute shortage and skyrocketing prices of nitroglycerin used extensively in the oil fields for shooting of wells. Prices of glycerin, a main ingredient of the explosive, have jumped more than 50% in recent months.

The newly completed refinery built by John H. Millikin, St. Louis capitalist, and associates, at the junction of the Frisco and Katy railroads in Vinita, Okla., is starting operation with crude supplied through a new 26-mile pipeline from the shallow-sand oil field near Chelsea.

Shell Transport and Trading Co. is increasing its capital to $25,000,000 with a view toward extending its operations and obtaining additional crude supplies. Negotiations near completion for a controlling interest in land and developments near Suez, Egypt.

25 years ago

February 6, 1936

Old Cut Bank field in Montana creates a sensation with completion of a well flowing 60 bbl. of oil per hour. The well, drilled by Santa Rita Oil & Gas Co. at 1 Lander, is by far the largest well ever brought in at Cut Bank. Few wells there have initial productions above 100 to 200 bbl. daily. Pay is the Sunburst zone at 2,843-58 ft.

Gulf Oil Corp. completes internal reorganization under which producing, refining, and marketing operations will be conducted as divisions instead of separate companies. New setup marks passing of Gypsy Oil Co., Gulf Refining Co., Gulf Production Co., and Gulf Pipe Line Co.

10 years ago

February 8, 1951

Tennessee Gas Transmission Co. buys 22-story Commerce Building, in Houston, from Jesse H. Jones Interests for $11,000,000. The company now occupies three floors of building's newly constructed annex, and two floors of main building. Expansion planned as additional space becomes available.

Largest gas well to date east of Mississippi River blows in in Leidy Township, Clinton County, Pennsylvania. New York State Natural Gas Corp. N-194 Finnefrok well registers flow of 125 M.M.c.f. in 18 hours with rock pressure of 3,650 psi. from Oriskany sand at 6,336 ft. Boost given deeper drilling in eastern areas.

Imperial Oil, Ltd., launches $14,000,000 building project at its Sarnia, Ont., refinery. Crude capacity to be increased to 71,000 bbl. daily.

JOURNALLY SPEAKING

The Pipeline Zipper

"WE NEED ZIPPERS, or glue, or something, to fasten pipeline joints together faster than hand welding."

That was an offhand remark by a Creole engineer in Venezuela 10 years ago. But Paul Reed, our peripatetic and persistent pipeline editor, didn't take it as a joke. He started an inquiry that resulted in the development of a machine that will lay a pipeline just about as fast as though the joints were zippered—described on page 84 of last week's issue.

Journalman Reed . . . persistence pays.

And today they're calling Paul the "grandfather of CO_2 welding."

Journal editors aren't supposed to be inventors or promoters of processes or equipment. We just report on industry problems and progress. But Paul Reed is the most persistent of the lot. And what he did to earn the title of granddaddy of the "pipeline zipper" was basically a reporting job.

Paul knew that there were a couple of dozen types of welding processes but that none of them had been successfully adapted to use by a machine moving along a right-of-way where the pipe couldn't be rotated. So a zipper, or glue, or an automatic welding machine would be the answer to every pipeliner's prayer.

Paul began digging into welding research and this so impressed his Creole friend that Esso Research & Engineering Co. hired Paul as a consultant, on leave of absence from the Journal, during two stretches in 1953 and 1954.

What he did, in essence, was to ask practically everybody what he was doing to develop a nonmanual welding process, and to write detailed reports on the progress or lack of it. But he asked his questions so persistently that he spurred a number of companies into further research after they were on the point of abandoning the idea because of the many technical difficulties.

One of these was Air Reduction Sales Co. which, under Paul's needling, discovered that cheap, common carbon dioxide gas worked well as a shield for arc-welding the kind of steel used in line pipe. This was a disappointment to Air Reduction, which was interested in selling helium and argon, not in laying pipelines.

To make a long story short, Esso Research turned Paul's reports over to Battelle Memorial Institute which picked up his trail, began its own research, and worked with several companies in adapting the new short-arc, carbon dioxide-shielded process for automatic use on a pipe-laying machine.

Paul witnessed the payoff last week at the successful demonstration of the prototype machine at Odessa. And there they all hailed him as the grandfather of the new baby.

So if, in a year or so, new pipelines are put in the ground so fast that it seems they must be zippered together, that will be Paul Reed's "grandson."

—Henry D. Ralph

Today's Discoveries Are Yesterday's Dry Holes

Welex's Simplified Logging Program today logs many discovery wells in areas once called "dry hole" country.

Thanks to modern techniques, such as the Welex program, you can now pinpoint and produce profitably many pay sands, ignored by old-fashioned logging tools a few years ago.

The Welex Simplified Logging Program does this for you ACCURATELY and FAST.

Introduced to eliminate confusion and complicated computations, the Welex program within minutes gives you the answers to the two main questions — WHAT IS THE POROSITY and WHAT IS THE FLUID SATURATION.

Based on only two factors — type of porosity present and drilling mud/formation water salinity contrast — the Welex Simplified Logging Program makes selection of the BEST LOGGING PROGRAM for every well easy, as shown by the diagram here.

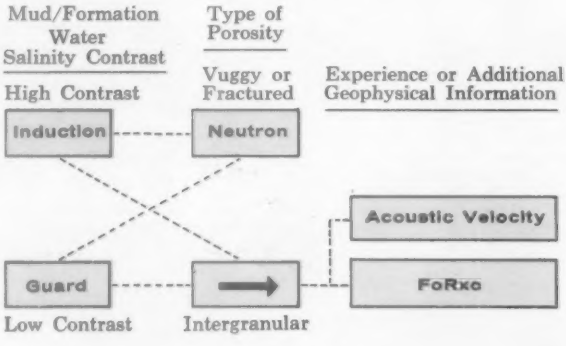
The addition of Welex's Acoustic Velocity Log to the program makes even more information available to you. The Acoustic Velocity Log, with Caliper of course, is the ideal choice in:

1. Formations where experience or past performance indicates that its porosity values are more accurate.

2. Areas where velocity data is desired for geophysical purposes.

As with the Welex FoRxo and Neutron Logs, you can read porosity values directly off the Acoustic Velocity Log. When run in conjunction with the Welex Induction or Guard Log, your most important question — WILL THE WELL PRODUCE? — can be answered in minutes by using the Simplified Interpretation Charts or "pigtails" printed right on the log.

The Welex Simplified Logging Program IS THE ANSWER for your well.



COMPLETE WIRELINE Welex SERVICES

WELEX

A Division of Halliburton Company

General Offices: 1728 Old Spanish Trail, Houston, Texas

How and when drilling will begin to increase

THERE is a widespread impression that the drilling segment of the oil and gas industry is abnormally depressed.

This is not so. Actually the 1960-61 rate of drilling is very close to normal. It is about what should be expected in the light of the factors that historically have influenced drilling.

What makes the current rate seem so bad is its contrast with the abnormal hump in annual completions during the middle 1950's.

WHAT DETERMINES the drilling rate is the amount of money the industry receives from the sale of domestically produced oil and gas, plus new investment from outside sources, minus funds spent abroad.

There may be local drilling flurries, stimulated by land plays, big strikes, or other temporary factors; but by and large, year after year, for the nation as a whole, there is a remarkably close correlation between production income and the footage drilled.

Beginning about 1953 there was a big upsurge in drilling, peaking in 1956 with 58,000 completions. This was due to three things: The industry's earnings were good; there was a strong flow of outside investment into the oil business, some of it classifiable as "gambling money", "tax dollars", or "throw-away funds"; to a certain extent the industry itself "borrowed" against future income by drilling more wells than it actually needed or were justified by current income.

Then the aftermath of Suez jarred the industry into reality, and the drilling rate has been off sharply since 1957. The industry's income has been down, the flow of outside risk money has virtually dried up, and a sizable share of the industry's drilling funds has been spent abroad.

Now the 1960-61 drilling rate of just under 47,000 completions per year is again back in very close relationship with industry income.

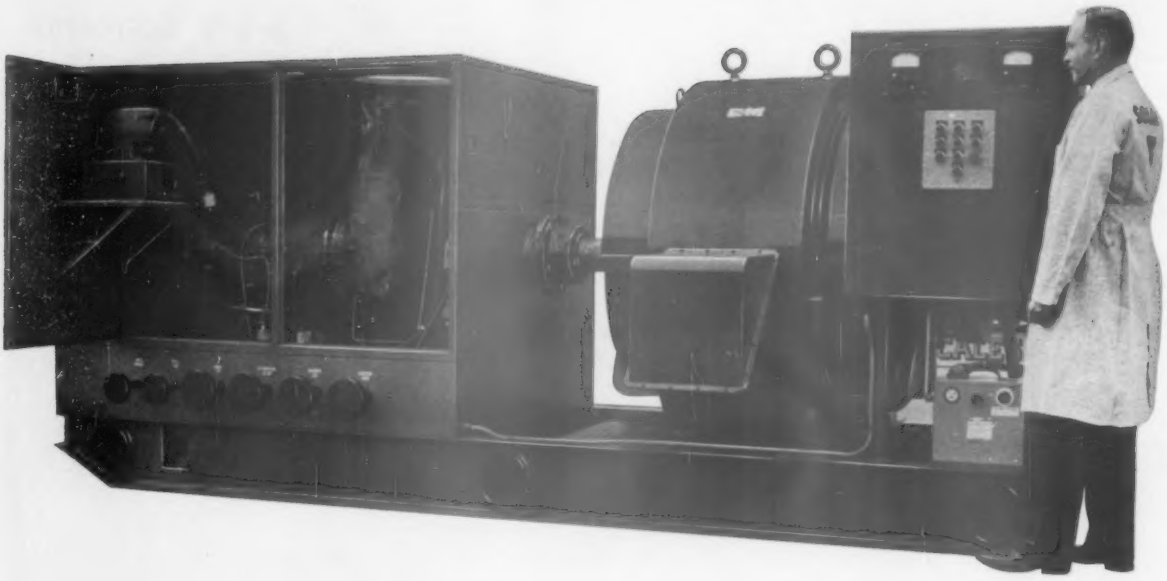
So the question "When will drilling pick up?" is answerable by the question "When will the industry's income increase?"

THE INDUSTRY'S INCOME is determined by the number of barrels and cubic feet it sells times the price per unit. Volume is a function of demand; price is a function of supply plus management.

Demand for the products of crude oil is inching ahead at the rate of about 2% a year currently, and demand for natural gas and natural-gas liquids is growing at roughly double that percentage. Population forecasts suggest somewhat higher rates starting in a couple of years.

Discounting government interference, price depends on how well supply is related to demand and how well the industry handles its surplus capacity and adjusts its marketing practices to maximize earnings.

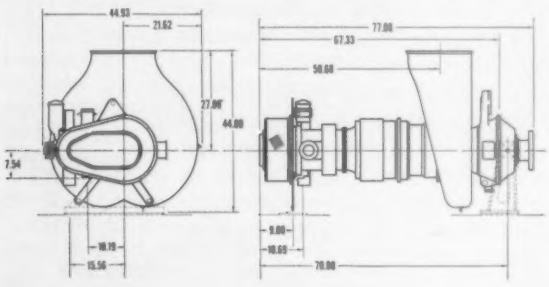
At the moment, surplus capacity seems to be fairly well checkreined, market prices are firmer than a year ago, the industry's earnings outlook is much improved. If this continues throughout the year, the 1962 drilling picture should look much brighter.



800 KW!

Solar industrial gas turbine generator sets ideal for peak loading or constant duty

Versatile, compact industrial generator sets powered by Solar's T-1000 gas turbine engine have a nominal rating of 800 kw. They are ideal for either peak loading or constant duty electrical power applications. Simple design and rugged construction reduces maintenance



to a minimum. Installation is extremely simple. The engine is about 1/10th as heavy as diesel units of similar horsepower and occupies only 51 cu ft. No elaborate foundation or flooring base is required because the gas turbine is practically vibration-free.

Equipped with one of the several control systems available, the engine can be operated remotely and entirely automatically. It starts instantly and operates at full load without warmup, even after long periods of standby service.

Fuel economy of the Solar T-1000 engine is unmatched in its field. The engine runs equally well on a variety of fuels including gasoline, diesel fuel and natural gas. The exhaust may be used in a waste heat boiler or as combustion air in process apparatus or conventional boilers.

Cost of this gas turbine is competitive with diesel engines in many industrial applications. For further information on Solar's turbine-powered generator sets, its complete line of gas turbine engines or industrial compressors, write to Dept. H-206, Solar Aircraft Company, San Diego 12, California.

SOLAR

A subsidiary of International Harvester Company

Will the Compacts Cut Gasoline Sales?

• Yes, chorus the oil economists. But how much? That's the question few agree on. Sales of compacts will keep growing, but the emphasis is away from economy—and nobody knows yet the role little cars play in family plans.

Gene T. Kinney
East Coast Editor

THE IMPACT of the compact car is causing economists to scale down their forecasts of future increases in U. S. gasoline demand.

As the horsepower race of the previous decade inflated consumption, it now appears that compacts may be costing the industry 200,000 bbl. daily in sales by 1965.

As one forecaster put it, "Detroit gave us an unexpected bonus with the big high-fuel-consumption cars of the 1950's, and now they're taking it away."

How much of this 200,000-bbl. daily estimate—some think it will be more, some less—can be called a net loss traceable to the small-car boom is debatable.

Forecasters may talk of how much compacts are "costing" in demand. But they point out at the same time that they are unable to translate into numbers the positive effects of the compacts on car sales and total driving.

There is wide divergence of opinion with respect to many of the assumptions that go into estimating gasoline demand. And so by 1965 the forecasts vary widely. Interviews with several industry economists turned up this range of views:

. . . **Gasoline demand** for passenger cars in 1965 will be anywhere from 4% to 9% below what it would have been had the nature of the car population remained unchanged from 1959. Reduced consumption will be due to improved fuel economy of the compacts.

. . . **Passenger-car consumption** in 1965 will range between 2,850,000 bbl. daily, the most conservative forecast, and 3,166,000 bbl. daily, the most optimistic. This compares with 1959 consumption of about 2,600,000 bbl. daily.

. . . **37% to 50% of new car** sales in 1965 will be economy compacts, including imports.

. . . **20% to 30% of all cars** on the road in 1965 will be compacts.

. . . **The premium gasoline sales** ratio, mainly because of compacts, will decline from 31% in 1960 to 29% in 1965.

Compact sales . . . The greatest variance among economists who are forecasting demand is in the rapidity with which the public will embrace the compact.

Many are playing it safe with purposely conservative forecasts, and are ending up about a year out of phase with actual sales. None is forecasting a compact-sales ratio anywhere near the highest estimates of the auto industry. But 1960 caused most to raise their sights.

In 1957, U. S. compacts and imports made up only 4.3% of total sales. This figure rose to 11.2% in 1958 and to 16.2% in 1959. In 1960, some 25% of new-car sales were compacts.

The rising trend was indicated by sales records for December of 1960 when the compact ratio was 35.7% (29.5% U. S., 6.2% foreign). In 1961 oil-industry forecasts of compact sales range from 35% (27.5% U. S., 7.5% foreign) to 39% (33% U. S., 6% foreign).

In 1965, the compact ratio is expected to increase to between 37% (32% U. S., 5% foreign) and 50% (43.7% U. S., 6.3% foreign). The total car population is expected to increase from 59.3 million at the end of 1959 to between 70.5 million and 73.3 million in 1965.

Average car usage . . . Forecasters generally assume a firm static average usage of automobiles of about 9,600 to 9,700 miles per year. But one forecast is as high as 10,165 miles by 1965.

They expect the increasing number of multiple-car families to hurt the driving average. But they believe this factor will at least be offset by the increasing use of first cars.

They assume that efforts to promote more weekend and pleasure driving will offset the loss caused by increased traffic congestion.

Fuel economy . . . Experience has quickly shown a great disparity between manufacturers' claims of gasoline mileage for compacts and results under everyday driving conditions.

Claims of 30 miles per gallon have shaken down to about 20 miles per gallon for American compacts. No oil-company estimate places the figure any higher than 21.5 miles per gallon. And all of those interviewed expect mileage to decline, the most pessimistic figure being 18 miles per gallon by 1965.

Detroit seems to be starting a new horsepower race in the compact field. The 1961 models came out with bigger optional engines. The public is showing a preference for the small cars, but is demanding at the same time many of the luxuries to which it became accustomed on the big cars and which hurt fuel economy.

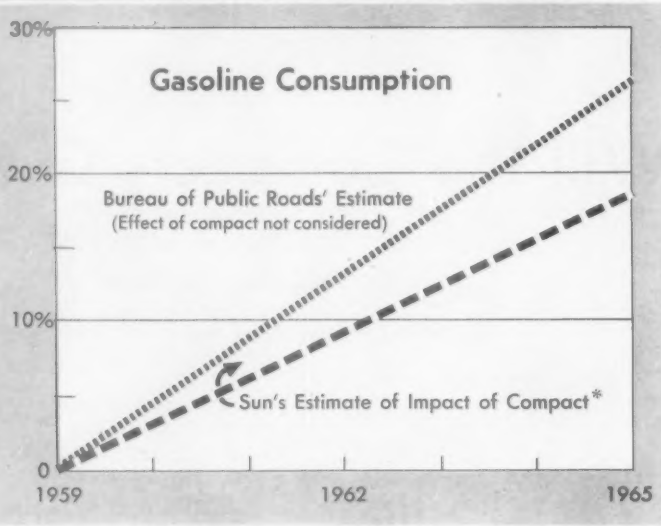
The paradox is pointed up in

How Rising Compact Sales May Affect Gasoline Consumption

Share of the New Car Market

	For Standard Sixes and Eights	For Compacts
1961	61-65%	35-39%
1965	50-63%	37-50%

*These estimates are from a study by F. B. Hufnagel, Jr., and Orville W. Magill, Sun Oil Co. The predicted impact of the compact on motor fuel consumption lies about half way between forecasts of several other studies shown to the Journal.



sales of Chevrolet's Corvair. When a de luxe model was introduced, it soon caught up with the economy Corvair and at last report was accounting for 55% of sales of this compact.

Observers are beginning to believe that it is the compact size, and not economy, that is responsible for its popularity.

If so, this would mean that the average U. S. car will be burning less fuel, but not as much less as was expected when the compacts first became an important factor.

For the small imports, a constant mileage is assumed between now and 1965. This is set variously at 26 to 28 miles per gallon. No important changes are expected in the foreign cars.

Oil economists expect standard U. S. cars to become smaller and more efficient during the next 5 years.

Working against this increased efficiency will be two factors: A worsening of traffic conditions, and the improvements in highway systems. As more limited-access highways are built, there will be more sustained high-speed driving with its poor fuel economy.

Urban and suburban traffic congestion is increasing faster than bottlenecks are being removed. And this too will mean poorer gasoline mileage.

Considering these factors and several others too, economists interviewed estimate an improvement in average fuel consumption from 14.3 miles per gallon in 1959 to 15.5 miles per gallon in 1965.

Smaller and bigger cars . . . As if to complicate the forecaster's job still further, Detroit refuses to stand still.

A much more varied line of automobiles is apparently in the works. The introduction of the small compacts was only the beginning. Another step was the addition of the "big compacts" in the Buick Special class for the 1961 model year, narrowing the gap between the compacts and the standard sizes.

Next will come models to offer a still more complete range of sizes. Later this year Ford is expected to bring out its Volkswagen and Renault-size small car. And other designs planned after 1962 will mean an end to well-defined size classifications. The prospect instead is for a continuous range from the foreign miniatures to the Cadillac.

More questions than answers . . . In analyzing the effects of the compact and other auto trends on the gasoline market, the economist is likely to come up with more questions than answers.

This is the type of forecasting that he likes least—that which is based mostly on other forecasts, with precious little history and a situation that is still fluid.

Already the economist is having trouble defining the compact. In calculating its impact on demand, he generally includes the larger compacts brought out this year.

He is also having trouble answering these questions:

What role will the compact car have in multiple-car families?

Will it be driven as much as the standard cars? Will its novelty cause it to be driven more at first until the newness fades?

To what extent will its lower price tend to create more two-car families and otherwise stimulate total sales and total driving?

What is the compact replacing? A used car? A new six? A new eight-cylinder larger car with twice the fuel consumption of the compact?

When asked these questions, the economist replies in this manner: "I'll be glad to tell you what I think, but that's all it is—what I think." He speaks from a background of having witnessed the recent surge to 300-hp. and higher automobiles, then the overnight boom of compacts of one-third the horsepower roughly equivalent to the low-price standard of 8 years ago.

In sum, he expects the compact to be an ever-increasing factor in the car market in the next 5 years; that it will have a net negative effect on gasoline demand and TBA sales, resulting not in declines, but in slower rates of increase.

Oil Man Picked for Top Washington Oil Post

- Kennedy's choice for assistant Interior Secretary for minerals: John Kelly, oil operator, geologist, engineer.

JOHN M. KELLY, a New Mexico independent oil operator and mining engineer, has been asked by the Kennedy administration to be Interior assistant secretary for mineral resources.

Announcement of the appointment had not been made late last week but it was expected momentarily, barring any unforeseen last-minute hitch.

Kelly, 46, is owner and operator of Elk Oil Co., an independent producing and wildcatting firm.

He has been active in numerous oil industry organizations and was once director and secretary of the New Mexico Oil and Gas Conservation Commission. During World War II, he represented New Mexico at the National Conference of Petroleum Regulatory Authorities, a group that worked with PAW in recommending maximum efficiency rates for various states.

Kelly was in Washington last week conferring with administration officials and is expected to return around mid-February to assume his post after confirmation hearings in the Senate.

If the planned appointment jells, Kelly will become one of the top oil officials in Washington circles and is expected to carry a great deal of weight in shaping government oil policy.

It had been known that Interior Secretary Stewart L. Udall had wanted a man with some oil background for the post of assistant secretary, particularly since neither Udall nor his under secretary is familiar with oil problems or the oil industry.

In effect, therefore, Kelly will have an oil role similar to, or perhaps even greater than, that of former Under Secretary Elmer Bennett, top oil-policy man at Interior under the previous administration.

Kelly will have other duties, too. All mineral resources, including coal, will come under his supervision. For this reason, it is understood, the Kennedy administration was pleased that Kelly has a degree in mining engineering and holds an interest in some mining properties.

Who he is . . . To his friends Kelly is a "stubborn" wildcatter, a staunch—but not overly liberal—Democrat, and an independent thinker.

He's been an independent oil operator since 1945.

John Kelly
. . . Wildcatter in a policy role.

Kelly got his BS in mining engineering in 1936 and his BS in petroleum engineering in 1939 from New Mexico School of Mines.

He was New Mexico state geologist and director of the conservation commission from 1941 until 1945.

He has been a director and treasurer of the New Mexico Oil and Gas Association, a director of the Independent Petroleum Association of America, and a member of IPAA's natural gas and its federal and public lands committees.

Kenai Gas Play's "Too Good"

- After fifth straight completion, Union and Ohio decide to suspend drilling because supplies far exceed demand.

UNION OIL CO. and Ohio Oil Co. last week completed their fifth consecutive gas well in the Kenai unit on Alaska's Kenai peninsula.

If the two companies had this kind of success in the rest of the U. S., other companies would be clamoring to get in on the play. But the 5-for-5 success in Alaska is a different story. In fact, the two companies temporarily are calling off their drilling program.

"We've got more gas now than anyone up there can use," one company spokesman said.

The companies will sell part of the gas to Anchorage once a pipeline is completed, but they already have proved up more than enough to take care of the pipeline's needs.

The latest well, the 44-18 Kenai unit, flowed at the rate of 5,300 M.c.f. daily through a ⅜-in. choke with a tubing pressure of 1,550 psi. The flow came from a 40-ft. perforated interval at 5,688-5,728 ft. Total depth of the well was 6,020 ft.

The 44-18 extends production 2¼ miles south of the discovery well and extends the north-south trend to almost 5 miles. One previous well, 14-4, stepped out production 2 miles to the east.

Surface location for the latest well is in the northwest corner of Sec. 19-4n-11w, but the well was bottomed a few hundred feet north in Section 18. A swampy area in Section 18 forced the operator to whipstock the well.

Union, operator on the unit, gave no indication when drilling will be resumed.

However, it is doubtful any additional drilling will be done until more markets are developed. The companies have explored several outlets for the gas, including liquefying it and shipping the methane to Japan by insulated tanker.

Quiet, Influential Williams Ranks as Top Depletion Foe

MANY oil observers consider Sen. John J. Williams (R.-Del.) the biggest single threat to oil's long-standing 27½% depletion provision.

They give him this designation even though there are other oil critics who make louder, more frequent attacks on the percentage provision.

They note that he is a quiet, soft-spoken conservative—not at all a member of the "bleeding heart" clan. Therefore they feel that he can carry considerable weight in circles that have, for the most part, supported the tax provision for oil.

They point out, too, that Williams does not appear to be simply a headline hunter, but deadly serious in his views on percentage depletion. Thus he moves about quietly gaining support for his approach, biding his time.

Williams' attitude toward percentage depletion puzzles many in the industry. They don't understand how it happened.

Williams himself insists that he has no grudge against the industry. He insists, instead, that there isn't another industry he respects more.

He does not consider percentage depletion a tax "loophole," nor does he feel that the industry has abused the tax privilege granted to it by Congress.

He simply thinks that 27½% is too high.

Williams, 56, was first elected to the Senate in 1946. He was re-elected in 1952 and again in 1958.

He was born on a farm in Delaware and entered the grain business there at the age of 18.

In the Senate, Williams is considered a hard worker with particular interest in tax matters. He is a member of the important Senate Finance Committee.

During his first and second terms in the Senate, Williams conducted a successful one-man campaign against corruption in the tax field and agriculture subsidy programs.

His personal investigations were a big factor in the shakeup of the old Bureau of Internal Revenue. And many practices of the Commodity Credit Corporation were changed following his exposures.

He shows signs of discomfort at aligning himself with the group of so-called liberals in the Senate who delight in taking potshots at the oil industry in general and at percentage depletion in particular.

However, Williams is a practical politician. So he'll take votes where he can get them.

Depletion *WILL* Be Cut . . . says

• In an exclusive interview with the Journal, the influential

Clyde La Motte
Washington Editor

U. S. SEN. John J. Williams flatly predicts that oil's percentage-depletion provision will be cut—perhaps drastically—in the reasonably near future.

Pin him down and he places the time at some point in President Kennedy's tenure.

"We'll pick our spot," he says. "I'm not in favor of making a move until I think we have a good chance of winning."

Efforts by the Republican senator from Delaware to cut percentage depletion are not new. Why, then, does he think he can succeed now where he and others have failed in the past?

Here's why, as he sees it:

The election of John F. Kennedy gives the drive fresh momentum. Not only did Kennedy once vote for a graduated percentage - depletion cut himself, but many of his top tax and economic advisers have shown distinct leanings toward a tax overhaul that could very well include a revision in percentage depletion.

"Kennedy sort of shied away from the subject during his campaign," Williams says, "but we will remind him of his past voting record and I think we will wind up with him on our side."

A second straw in the wind: Williams recalls that each time there has been a Senate vote on the issue in recent years, advocates of a cut have gained votes.

Furthermore, Williams claims, some senators who have consistently voted against a cut are now wavering, particularly when facing the need for more tax revenues.

Finally, Williams figures that a move to cut percentage depletion will draw an additional following if it is linked with some attractive tax proposal such as lowering the ceiling on individual income taxes from 87½% to 60%.

Why a cut? . . . Williams has a simple answer when asked why he is so bent on attempting to reduce oil's percentage depletion:

"I don't think 27½% is fair under the existing tax structure, and I think the oil industry certainly is capable of paying its share."

How deep a cut? . . . Williams thinks the size of an eventual reduction will depend a great deal on the industry itself.

His theory: The harder the industry fights and the longer it stalls off a cut, the bigger the cut will be when it is finally made.

He cites labor legislation as an example of how the pendulum swings from one extreme to the other when either side gets the upper hand after a long, bitter struggle.

"I feel sure that if oil-industry

Delaware Sen. John J. Williams

lawmaker tells why he thinks the ax will fall

officials would sit down and talk this thing over with us we could work out something fair and reasonable and not too drastic. But if they don't . . ."

The senator's own plan now is to press for a reduction to 15%. But he insists that this is not an iron-clad figure with him.

"I don't consider there is anything sacred about 15%, any more than I think there is anything sacred about 27½%. But it's as good a figure as any."

He concedes that such a sharp, sudden cut—whether equitable or not—would have a tremendous—and damaging—impact on the industry.

"I am inclined to think that perhaps a smaller cut, maybe one spread over several years to make the reduction a gradual one, would be better.

"But let's face it: If it takes an all-out fight to get a reduction, we'll make it as big a cut as we can."

From the senator's point of view, a "reasonable" cut would not be the crippling blow to the industry that some believe—particularly if it were coupled with the rediction in the high rate of individual income taxes that Williams favors.

An income-tax cut in the top brackets would free more money for investment purposes and oil would benefit to that extent, he theorizes.

Foreign depletion . . . Williams will stoutly oppose any reduction applied solely to foreign oil operations by U. S. firms.

He figures that what is right for one is right for the other.

In taking this stand, Williams is aware there are some who advocate reducing or eliminating, foreign percentage depletion while leaving domestic depletion at 27½%.

"I don't favor concessions to foreign operations," he says, "but neither do I favor tax penalties.

"If an advantage must be given to the domestic oil industry, some other approach should be used, such as a higher tariff."

Therefore, if a proposal is made in Congress to cut foreign percentage depletion without a similar reduction at home, Williams will fight against it.

Strategy . . . The senator is not at all reluctant to discuss how he thinks a percentage depletion cut will eventually come about.

He expects the course of events to follow these lines:

The move for a reduction will develop in the Senate as a rider to some bill already passed by the House. This is likely because tax legislation must originate in the House, and because Senate rules permit more "free-wheeling" maneuvers.

Williams concedes that the rider approach has been tried before, without success. He blames this on the type of bill chosen for attachment of a rider.

"We want a bill that is going places; one that its supporters favor so strongly they would be willing to give a little ground on percentage depletion in order to get their measure through."

Timing vital . . . Together with selection of a bill as a vehicle for a percentage-cut rider, Williams considers timing important.

That would indicate a move to cut percentage depletion late in a congressional session when the pressure is on for action. However, it would not be so late there would not be time to make necessary adjustments in conference-committee meetings between the two Houses.

Waiting for the right time and place, therefore, is extremely important to Williams. And he thinks the time and place will arrive. That's why he's so confident that percentage depletion is going to be cut.

He tempers this prediction a little. "I'll admit that I tend to be an optimist," he says.

Whether he succeeds or fails, you may be certain that the Delaware senator is going to give it an all-out try.

Democrats Moving Toward FPC Majority,

THE DEMOCRATS, who for a time last year had no representation on the Federal Power Commission, will soon have a three-man majority and the chairmanship to boot.

President Kennedy has named two Democrats to the commission, Joseph C. Swidler and Howard Morgan. He will have an opportunity to name a third when the term of Arthur Kline, a Republican, expires in June.

Swidler will become chairman, replacing Republican Jerome K. Kuykendall. Kuykendall will remain on the commission until June 1962.

The term of Frederick Stueck, the third Republican now on the commission, expires in 1964.

So, until June of this year the lineup will be: Democrats Swidler and Morgan and Republicans Kuykendall, Kline, and Stueck.

The Democrats had no member on the commission after the death of John B. Hussey last year until President Eisenhower named Paul Sweeney to the post. However, Sweeney has been serving only as an interim appointee because the Senate last summer refused to confirm his nomination.

That left the commission in the hands of the three Republicans since the term of William Connole, an independent, expired last June.

Chairman Swidler: Wants a Healthy Industry

Swidler sees his role as one of protecting the consumer and at the same time maintaining a healthy industry.

He stresses the word "healthy" for, he says, he feels keenly that a healthy industry is necessary if consumer needs are to be served properly.

"I have a deep interest in the welfare of the industry," he says, "for I don't see how it is possible to divorce the interest of the consumer and the interest of the industry."

Swidler, 53, a long-time government lawyer, served for 24 years with the Tennessee Valley Authority. He is now in private practice in Nashville.

Swidler told The Oil and Gas Journal he has read the report on regulatory agencies written by James M. Landis for the President. He indicated his strongest agreement with it is its stress on the need for speeding the commission's disposition of cases.

"I think the matter of clearing up the congestion on the commission's docket should be one of primary concern, justifying extraordinary effort," he said.

He declined to comment on the FPC's current area-pricing approach, saying that he had not studied the matter sufficiently to voice an opinion.

Swidler did not indicate that he expects to land at the FPC with a major overhaul plan ready to put into effect.

He did leave the impression that he plans to take a hard look at the commission, its staff, its policies, and its methods of operation.

Only then will he feel he is ready to formulate policy and make any changes in procedures in an effort to improve and speed up the work.

Swidler, a University of Chicago graduate, became familiar with the work of regulatory agencies early in his career.

He did, at one time, appear before the FPC—and lost the case.

That was when, as an attorney for TVA, he represented the agency in an application for use of natural gas at a TVA power installation.

The FPC turned down the proposal, ruling that it constituted an "inferior" use of natural gas.

He also had a brief exposure to the oil industry. As assistant solicitor of the Department of Interior for 3 months in 1933, he worked on the NRA code for the petroleum industry.

"I remember that one of my associates there later became an executive in the oil industry," he recalled recently, sounding a mite wistful.

Member Morgan: Public Interest Comes First

Morgan considers himself a "public interest" man.

"The first objective of the commission should be to protect the public," he told the Journal last week in Washington.

"I am well aware, however, that in doing so, the commission must protect the legal and constitutional rights of the industry," he added.

He emphasized that he is approaching the job with an open mind and not with any preconceived formula or philosophy.

He said his intention is to learn as much as possible from all sides before making up his mind.

He did indicate he feels that the danger in most regulatory work is that the consumer interest does not get enough attention. By contrast, he said, industry spokesmen and others are in a position to state their cases strongly.

Thus it would appear that he will tend to lean over backward to assure adequate protection for the consumer, feeling that it will be easier to make later adjustments—if necessary—to correct any overemphasis on consumer protection.

Morgan obviously feels that much needs to be done to improve government regulatory commissions.

In a letter written last December to a friend in Washington, Morgan told of his exposure to federal regulatory agencies while serving briefly on the staff of the Defense Transport Administration during World War II.

"I promised myself that I would never return to Washington in connection with a regulatory agency except in a policy-making position and then only if assured that the President was determined to follow through with a thorough housecleaning and the appointment, at his earliest opportunity, of a clear working majority of commissioners dedicated to honest, vigorous regulation in the public interest," he said in the letter.

Morgan, 46, is an Oregon rancher who has been active in politics.

Chairmanship

Thomas Donegan was named to replace Connole, but was not confirmed by the Senate and refused an interim appointment.

Swidler will now move into the vacancy left by Connole, while Morgan will replace Sweeney.

Swidler and Morgan will not take office until after they have been confirmed by the Senate.

A committee hearing will probably be held within about 2 weeks.

Joseph C. Swidler

. . . Consumers need healthy industry.

In 1948 he was elected for a 2-year term in the state legislature.

From 1952 through 1956 he was chairman of the Democratic party of Oregon and is obviously proud of the fact that he helped elect Democrats to many major offices in his traditionally Republican state.

Beginning in 1957, he served for 2 years as a public utility commissioner in Oregon.

Morgan has been a rancher since 1948. He raised sheep until 1959, when he switched to cattle.

Last year he purchased a one-third interest in Pioneer Construction Co., a small heavy-construction company in Portland which specializes in dike, jetty, and other Marine construction.

watching WASHINGTON

Clyde La Motte

• Udall gets hit with oil problems right off the bat . . .

IT DID NOT take long for Interior Secretary Stewart L. Udall to discover that some of his biggest, toughest problems are going to be concerning oil.

He had scarcely had time to get his new chair warmed before he was asked to a high-level meeting with Canadian government officials. The subject: Oil.

That huddle was the forerunner of last week's announcement by the Canadian Government of a "voluntary" oil-import-control program (p. 88) which, among other things, calls for funneling more of Canada's crude, condensate, and natural-gas liquids into Mr. Udall's territory.

Fortunately for the new secretary, the meeting did not require any immediate decision from him. The Canadians obviously were not in Washington to ask if they could adopt a new oil policy. They simply wanted to alert U. S. officials, seek U. S. understanding and, if possible, get U. S. assurances that there would be no retaliatory moves.

The U. S. statement following the Canadian announcement was polite and proper. Tucked away in it was a repetition of an earlier warning that any increase in the flow of oil from Canada into this country would have to be a gradual, steady one.

• On paper, Canada's plan may work all right, but . . .

THE CANADIAN plan is simple. However, the implementation of it may not be. Like her sister nation, Canada has some differences of opinion in her oil circles.

The plan calls for a slowdown of crude and product imports into Montreal and the shipment of products westward from Montreal. This drop would be offset by an increase in refining in the Toronto area, using western Canadian crude. There would be an increased distribution of these products west of the Ottawa Valley to replace products made from foreign crude.

The other chief outlets would be the U. S. Pacific Northwest and the upper Midwest.

Most of the resentment to the plan may come from Montreal refining circles and the consumers of products made there from the cheaper foreign crudes.

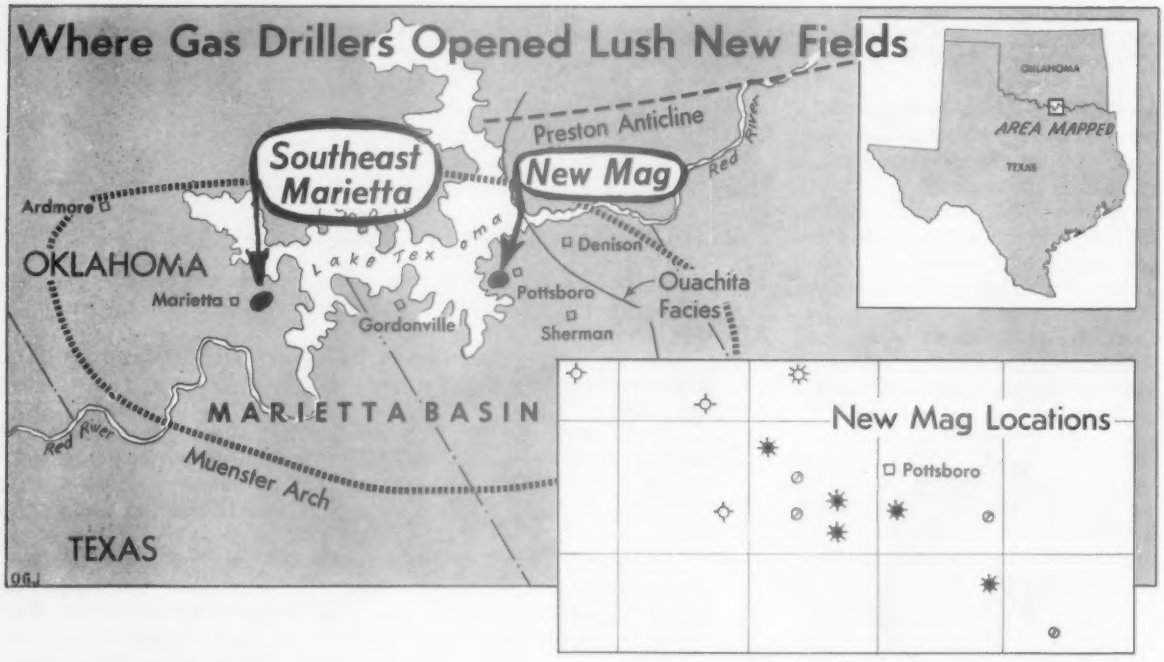
In the U. S., domestic producers will be eying the situation closely despite reassurances that most of the oil to be displaced to make room for Canadian crude will be crude from abroad rather than crude from U. S. wells.

And U. S. producers want to make sure that the 250,000-bbl. daily increase the Canadians are talking about includes all crude, condensate, and natural-gas liquids—not 250,000 bbl. daily of crude alone.

• How long will Canada's oil program stay voluntary?

CANADA figures that the success or failure of its "voluntary" control program rests pretty largely in the hands of four or five major international oil companies operating in Canada.

If those companies cooperate, the Canadian plan may run fairly smoothly. If not, there will be trouble. Canadian government officials, knowing this, have dropped the not-so-delicate hint that the boys had better play ball if they plan on continuing to operate happily in Canada.



Marietta Basin Dazzles Gas Hunters

• Unusually rich condensate yields and big gas flows in the New Mag and Southeast Marietta fields have kicked up lease prices in the area. Well costs are high, but they are offset by short-term payouts.

Robert J. Enright
District Editor

THE BIGGEST, richest gas strike in North Texas and a twin discovery across the border in Oklahoma have sent lease prices zooming in the two-state Sherman-Marietta basin.

The North Texas field is New Mag Oil Creek (Ordovician) near Pottsboro in Grayson County. Its Oklahoma twin is the Southeast Marietta field, producing from the Oil Creek at about 14,000 ft. across Lake Texoma in Love County.

The existence of these two lush gas-condensate fields, suggesting the possibility of a chain of like pools through the deep central portion of the northwest - southeast trending basin, has inspired operators to gobble up leases like popcorn in the past several months.

Southeast Marietta now has 9 wells averaging about 50,000,000 cu. ft. daily of gas with high condensate yield.

And there's nothing like New Mag throughout North Texas. Standard Oil Co. of California, parent firm of the discoverer, Standard Oil Co. of Texas, rates New Mag at the top of its world-wide gas holdings.

Wells there are coming in for 50,000,000 to 80,000,000 cu. ft. daily and with even higher condensate yield than at Southeast Marietta.

The field discovery in 1959, Standard of Texas' 3-2 Mary McAdams in Childs Survey, came in for 78,000,000 cu. ft. of gas daily with a condensate gage of 278 bbl. per million cubic feet. Total condensate potential was a staggering 21,664 bbl. daily. Production was through perforations at 12,813-55 ft. and 12,865-84 ft. Shut-in bottom-hole pressure was 7,835 psi.

Box score at New Mag to date: 6 producers, 3 dry holes, and 4 wells now drilling.

Limits shaping up . . . It looks as if New Mag will cover 2,500 to 3,000 acres eventually.

Drilling so far has pretty well proved up field bounds except on the south and east.

Production to the north is limited by a tremendous 4,000-ft. east-west fault. New Mag's sixth and latest completion, Standard of Texas' 3-1 Mary McAdams, actually found gas in the Oil Creek to the north of the fault. But production was so puny (potential was only about 4,000,000 cu. ft. a day) and so deep (16,500 ft.), that further drilling north of the fault is unlikely.

The 1 McAdams actually was the first well drilled by Texas Standard in the New Mag campaign. It was temporarily abandoned at 12,508 ft. and reentered last year. All other field completions have been roughly comparable in size to the discovery, and all lie south of the fault.

Production now is defined to the northwest by dry holes drilled by Standard of Texas and Russell Maguire and Sunray Mid-Continent Oil

JACKKNIFE RIG drills for Russell Maguire and Sunray Mid-Continent on one of the leases in the prolific New Mag field.

Co. Drilling at the latter was suspended at around 6,000 ft. short of the Oil Creek when Standard of Texas plugged its 1 C. T. Fulton duster at 13,315 ft. in C. W. Thomas Survey.

The field is further limited on the southwest by Russell Maguire's 1 Chiles Oil Creek unit in W. B. Washington Survey. This test found water in the Oil Creek at 13,300 ft. Operator moved back up the hole to 9,500 ft., sidetracked upstructure, and now is nearing 12,000 ft. in sidetracked hole.

The 1 Chiles definitely defines the field on the southwest. And with its show of water in the Oil Creek, Continental Oil Co. immediately halted drilling and plugged its 1 R. D. Wilson in Henry Keith Survey ½ mile further west.

Moving east . . . Easternmost completion to date is Shell Oil Co.'s 1 J. R. Whitfill in J. D. Goode Survey about 4 miles east southeast of the discovery. Standard of Texas now is drilling below 10,000 ft. in an extension attempt ½ mile north at its 1 Guilloud in W. W. Parks Survey.

And operators are closely watching Irwin Producing Co.'s effort to bring in its 1 Brown in J. S. Soule Survey as a producer on the southeast flank. At last report, this well had set 3½-in. liner at 13,310 ft. and was running logs prior to testing the Oil Creek.

It is ½ mile southeast of Shell's 1 Whitfill—farther south and east than any other field well—and is expected to hit the Oil Creek at about the same depth as Maguire's 1 Chiles Oil Creek unit.

The only other well now drilling is Standard's 1 Amy Chiles, now nearing 10,000 ft. in Childs survey.

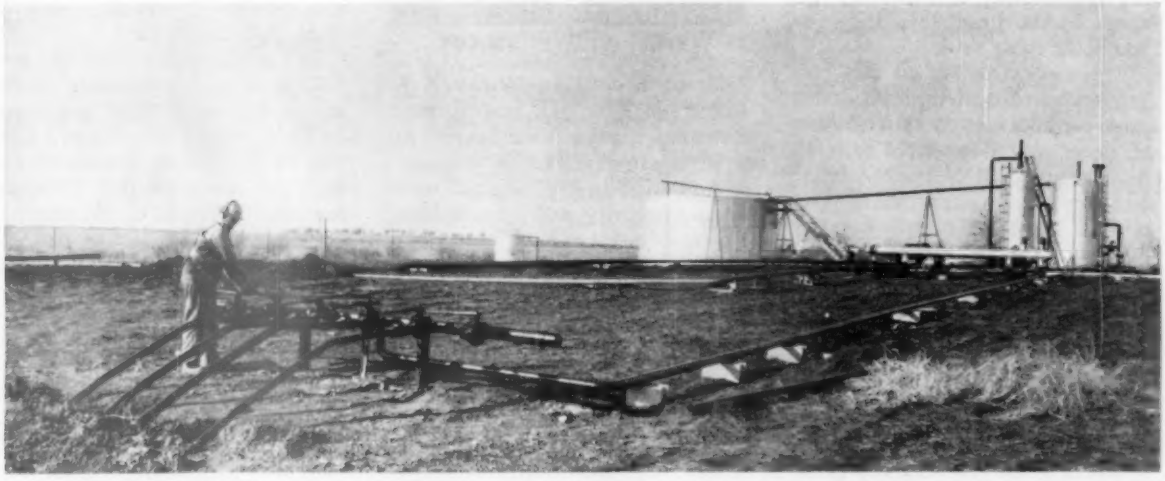
Rich reserve . . . The three remaining producers in the field—all drilled by Standard of Texas—are in the central portion in John C. Wade and C. C. Blinkley surveys.

The Shell well and these three have potentialed more than 50,000,000 cu. ft. daily apiece, with condensate yields of better than 230 bbl. per million cubic feet.

Shut-in pressures are averaging about 7,800 psi. daily. And net pay thickness averages better than 50 ft.

Standard of Texas declines to estimate reserves but acknowledges they are large. The field got its first gas outlet last November when Lone Star Gas Co. completed a 6½-in. line into the area. Production from the field so far, a Texas Standard spokesman says, has had no noticeable effect on pool pressure.

Standard of Texas holds a dom-



HEADER CONNECTIONS are made during work on New Mag's first LACT unit, operated by Standard Oil Co. of Texas.

inant acreage position on the New Mag structure, with Shell and Maguire probably next in line.

High well cost . . . Well costs in the field average about $400,000. And they can go higher. The cost of Standard's disappointing 3-1 McAdams, for instance, is estimated at about $1,200,000.

And Russell Maguire and associates likely will invest $700,000 or more in the 1 Chiles Oil Creek unit (the sidetracked hole) before drilling is completed.

Drilling is treacherous. In some cases, shale has been heaved up the hole.

The high well costs, however, do not seem to be noticeably deterring operators with reasonably proved acreage in the field.

Trend search shaping . . . The search for additional lush Oil Creek gas-condensate pay has spread out generally along a line between New Mag and Southeast Marietta, discovered by Pastotex Petroleum Co., a sister firm to Standard of Texas.

Grande Corp., Dallas, has drilled two deep dry holes to the Oil Creek several miles west of New Mag. Tennessee Gas Transmission Corp. and Texaco Inc. are drilling below 5,000 ft. at the 1 Kindsfather in Grayson County northwest of Gordonville, Tex., about 20 miles west northwest of New Mag. This one also will go to the Oil Creek in Lot 4, Aaron Burns Survey, Abstract 1469.

Area of complex geology . . . The Marietta basin, or syncline, is a relatively small, deep basin taking in most of Grayson County and northeastern Cooke County in North Texas and southeastern Love County in Oklahoma.

Bounds are none too clear in any direction. It is confined on the west and southwest by the buried Muenster arch and the platform on which the oil fields of the Sandusky area are located.

To the north it is at least partially hemmed in by the Criner Hills trend and Ardmore basin. Some geologists think it likely that the prominent Criner Hills axis ceased to exist or became so deeply submerged in the early Pennsylvanian basin that it failed to act as a barrier between the Ardmore and Marietta basins.

On the east, the Ouachita facies cuts north to south across the eastern portion of Grayson County. And it is unknown whether the Marietta basin dips in under the Ouachita rocks or ends along this line.

One of the most prominent features in the basin is the Gordonville trough, a deep southeast-northwest trending trench.

The depth and heavy thrust-faulting in this area—which at the same time look most promising for new Oil Creek finds—make a fine geological headache. But the operator who wants to gamble gets a crack at big winnings. The gas potentials are enormous — with a significant bonus in unprorated condensate.

New Sales Setup Pushes Selling

• Tidewater takes away field managers' offices, cuts out staff positions in a move to increase actual selling.

IF HE only had access to authority for quick on-the-spot decisions, goes the salesman's plaint, he could increase business right and left.

The salesman in Tidewater Oil Co.'s Eastern Division has now been told: "All right, the authority and the responsibility have been brought closer to the firing line. Let's see you make those sales."

Tidewater's answer to the marketing challenge of the 60's—what some consider a fairly extreme form of decentralization—went into effect last week. It is the key to the company's bid to strengthen its position in a market which is under pressure from a slackened rate of growth and expansionist drives of new and established marketers.

New philosophy . . . Authority has been redistributed all down the line; it is decentralization in fact as well as in form.

Many top-level decisions formerly put to J. G. Jimenez, vice president and general manager of the

REED

McCOY

division, have been delegated to Robert G. Reed III, new assistant division manager, who came up from division marketing manager.

And some of the assistant manager's authority and responsibility has been shifted to Reed's successor, D. Y. McCoy. And so the pattern goes through district, area, and field levels.

Formerly, if a salesman brought an idea for getting new business to his area supervisor, he likely would have had to wait for clearance through channels. Now, his boss will be more inclined to let him go ahead.

The reorganization will put more men with more authority in the field. It will decrease staff functions and nonsales responsibilities.

New organization . . . Under the division marketing manager there will be three districts instead of four—New England, New York, and Middle Atlantic, the latter encompassing the old southern district (OGJ, Jan. 30, p. 89).

Each district will have three or four areas, each headed by an area manager free to spend a majority of his time in the field.

In each area there will be three field sales managers—with emphasis on the word "field"—formerly called area sales supervisors. Each will be responsible for five salesmen, the maximum that Tidewater feels should report to one man.

One significant fact is that the field sales manager has no headquarters office. He operates out of his automobile. With no routine paperwork to burden him, he can spend one day a week with each of his salesmen on the road. The de-emphasis on staff and emphasis on line sales force is evident in the fact that 16 positions at the division level have been eliminated.

An advanced new packer for production and well-stimulation

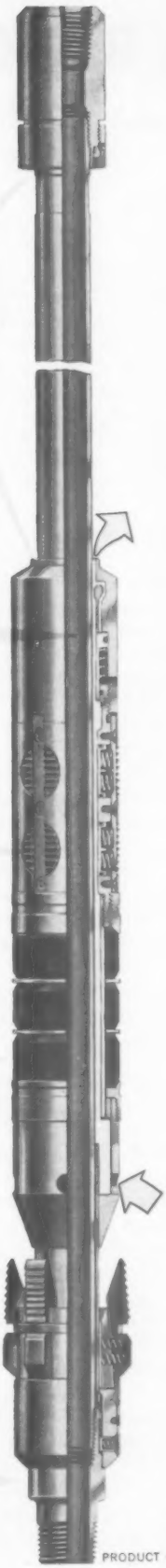
THE *BAKER* MODEL "R" DOUBLE-GRIP RETRIEVABLE CASING PACKER

A long-stroke (30″) packer with simple one-turn right control-pin setting, automatic bottom and hold-down... for combination acidizing, fracturing and production operations.

Now Baker brings new convenience, new reliability, to the familiar long-stroke production packer with hold-down.

This results from a new design concept that moves the hold-down from the tubing to the packer, placing it below the bypass valve. This restores surface control of the bypass valve for pressure equalization, eliminates button dulling, and provides dependable release of the hold-down.

And, back of the Model "R" is the Baker service organization. Domestically, 62 Baker field-service warehouses stand ready to supply packers, parts and repair service. Ask one of the 400 Baker servicemen to give you the complete story on both the Double-Grip and Single-Grip (no hold-down) versions of the Model "R" Packer.



NEW
Face-Seal Bypass Valve
Seals instantly, is non-plugging

NEW
Differential Lock
Locks bypass valve closed; unlocks when tubing is picked up

NEW
Integral Hold-Down
Holds packer down, but does not interfere with use of bypass valve

Proven 3-Element Packing System

Dependable Rocker-type Slips

NEW
Automatic Bottom
Locks slips in retracted position when tubing is picked up

PRODUCT 642-R

HERE'S HOW THE NEW DESIGN CONCEPT WORKS...

(1) Note that the *Bypass Area* through the packer is completely isolated from the packer mandrel and tubing. Pressure surges in the tubing cannot dull buttons while running in or retrieving. Solids in tubing fluid cannot compact behind buttons and prevent retraction.

(2) Note that the *Hold-Down* is a part of the packer, not attached to the mandrel... leaving the bypass valve free for instant pressure equalization.

(3) Note that a *Differential Lock* holds the bypass valve closed without requiring high set-down weights... yet can be instantly released by picking up on the tubing.

The new concept in long-stroke packers is fully explained in Bulletin 385. Write: Baker Oil Tools, Inc., P. O. Box 2274 Terminal Annex, Los Angeles 54, California

BAKER
BAKER OIL TOOLS, INC.
HOUSTON / LOS ANGELES / NEW YORK

TGT Buys Pan Am's Bastian Bay Gas

• Sale of the rich South Louisiana reserves for more than $150 million is one of the biggest deals of its kind in gas history. TGT gets a trillion cubic feet of gas to add to its already-substantial supply.

ONE OF THE MAJOR gas-reserve transactions in industry history — a $150 - million - plus deal involving more than 1 trillion cubic feet of gas—has been closed by Tennessee Gas Transmission Co. and Pan American Petroleum Corp.

TGT is taking over Pan American's producing leaseholds in Bastian Bay, Plaquemines Parish, Louisiana, and thus adding the huge reserves to its own gas supply.

The sale appears to fall in the same pattern as that developed by Texas Eastern Transmission Corp. at Rayne Field, Louisiana, where Texas Eastern paid more than $134 million to four producers for the in-place reserves (OGJ, Sept. 14, 1959, p. 66).

TGT pointed out last week—as did Texas Eastern with its purchase—that acquiring full ownership of the reserves gives the buyer control over production and marketing of the gas.

The method also bypasses rate regulation by the Federal Power Commission, since TGT will be putting its own gas into its lines, not buying it.

TGT did not say whether it will go to the FPC for general approval of the purchase from Pan American. In the Texas Eastern case, such approval was sought and granted.

What's involved . . . The sale agreement provides that TGT, acquires from Pan American, all of its Bastian Bay leasehold rights down to the base of presently known producing formations, and all well and lease production equipment.

TGT will operate and develop the field. It plans to increase gas deliveries during winter peaking and reduce them during the low-demand summer months.

In the sale are 10 leases, 11 gas wells, and 13 oil wells in which Pan American held 100% working interest. Also there are three joint-interest leases with one oil well and two gas wells.

Pan American was the major lease owner in the field and the field operator. Other major producers, such as Gulf Oil Corp. and Tidewater Oil Co., were not involved in the sale.

Payment . . . While not giving details of the purchase agreement, TGT said it was paying more than $150 million for the Bastian Bay reserves.

Reports in the industry were that sale price was $159,000,000, with 6% in cash and the rest in interest-free notes payable over 18 years.

It also is understood that reserves are to be recalculated at the end of 5 to 7 years and that the sale price will be refigured at that time to cover any additions to reserves during the period.

TGT has a pipeline crossing the area and has completed field connections to it. Gas deliveries already have started.

The company did not disclose any specific plans for its new supply.

In the past, TGT sought the Bastian Bay reserves for either transport to California or to exchange for Texas Reserves which would be routed west instead of east.

Currently TGT is applying to the FPC for authority to build a line from South Texas to California by way of northern Mexico. In this case, however, Humble Oil & Refining Co. has agreed to furnish gas from its King Ranch reserves. Mexico also would be a supply source.

The TGT - Pan American deal disposes of a majority of the known reserves in Bastian Bay, but the fate of the still-huge holdings of Gulf Oil and Tidewater is still to be decided.

An FPC hearing examiner is currently holding hearings on an application by United Gas Pipeline Co. for certification of a $16.9-million project to transport additional gas from the Bastian Bay area.

Under the plan, Gulf Oil Corp. would supply 45 million cubic feet daily and Tidewater Oil Co. would supply 50 million.

The initial price in each instance would be 24.8 cents per M.c.f.

Because the hearing is in its early stages, no decision by FPC is likely soon.

Field's history . . . In recent years Bastian Bay has been the most widely sought big gas reserve on the Gulf Coast. Offers have been made by almost every major gas pipeline which originates in the area, and by others which do not yet purchase on the Gulf Coast.

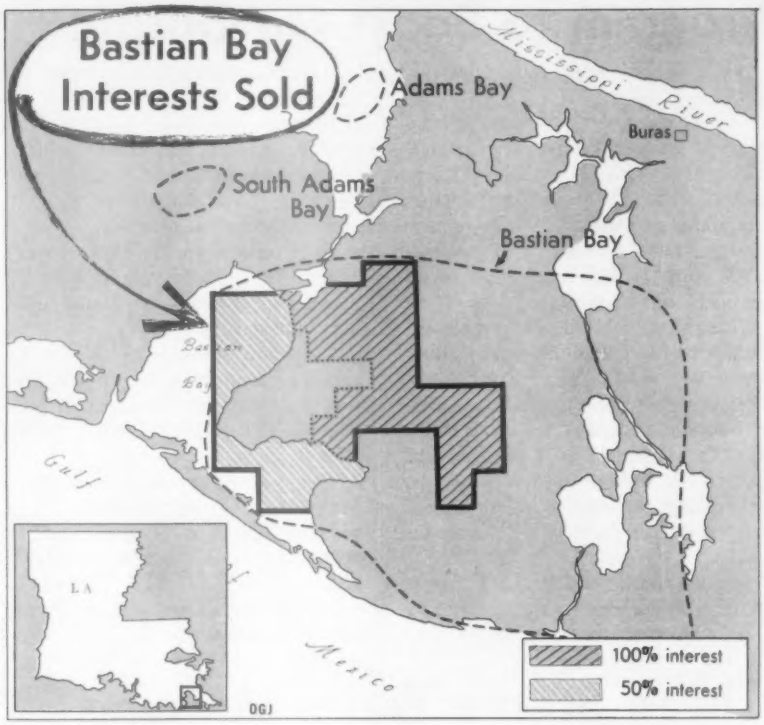
Bastian Bay is in low-lying delta marshes 5 miles southwest of Buras, La. The field extends into the Bastian Bay arm of the Gulf of Mexico.

Texaco Inc. located it as a prospect in 1938 through a reflection seismic survey. The discovery well,

PIPELINE

A 42-mile extension of Buckeye Pipe Line Co.'s Midwest products system from Flint to Bay City, Mich., is slated to get under way this spring. The 8-in. line will provide the first products-pipeline service to the Bay City area. Completion of the $1,700,000 project is expected by fall.

An $83 million, 2-year program to add 225 million cubic feet to its system capacity is planned by Texas Eastern Transmission Corp. The first phase, to be handled next winter, would include a 165-mile, 20-in. line from West Monroe, La., to Kosciusko, Miss.; 128 miles of 30-in. loops between Kosciusko and Lambertville, N. J., and 37 miles of laterals in New Jersey. The sec-



drilled by Phillips Petroleum Co. in 1941, flowed 324 bbl. of oil daily from a 9,350-ft. sand.

Latest figures show 27 wells producing gas and condensate and 19 oil wells in Bastian Bay.

These wells produce from a multiplicity of zones. Most of the gas is from reservoirs containing no oil.

Several wells are producing from depths below 15,000 ft. The deepest is a Pan American gas well, producing from 15,314-35 ft.

Gas reserves in Bastian Bay are estimated at more than 2 trillion cubic feet.

Rival Companies Push Plans for LPG Pipelines

BOTH of the companies proposing LPG lines from Texas to North Carolina moved their plans ahead last week.

Dixie LPG Pipe Line Co., the Tuloma - Phillips - Warren - Union Texas enterprise, engaged Service Pipe Line Co., Tulsa, to design and construct its line. Dixie says the line will start operating this fall.

Trans-Southern Pipeline Corp., Dixie's rival, began work on its third river crossing. It is laying dual 10¾-in. lines across the Mississippi River near St. Francisville, La., and plans to start laying main-line pipe next month.

Dixie has not yet completed its organization nor has it disclosed the full extent of its ownership. Selection of Service to handle construction is attributed in part to the fact that both Tuloma and Service are subsidiaries of Standard Oil Co. (Ind.).

Trans-Southern's Mississippi crossing is being laid in conjunction with a 30-in. gas-line crossing that its parent company, Transcontinental Gas Pipe Line Corp., is making at the same point.

BRIEFS . . .

ond phase, including 144 miles of line, would be built in 1962.

Two lines totaling 267 miles will be built by Alamo Gas Supply Co. to pipe Texas Gulf Coast gas to San Antonio. A 166-mile line of 20, 22, and 24-in. pipe will carry gas from a southern area, while a 101-mile line of 12, 16, and 24-in. pipe will move gas from an area east of San Antonio.

A new pipeline system will be constructed by Phillips Pipe Line to link the Camrick field in the Oklahoma Panhandle with the Phillips Petroleum refinery, Phillips, Tex. A 75-mile 6-in. main line and 85 miles of 4-in. gathering lines will handle crude and condensate.

Work on a 32-mile system to serve the North Dover and East Hennessey fields in Kingfisher County, Oklahoma, is being completed by Champlin Oil & Refining. The system, 21 miles of 6-in. line from Champlin's Enid refinery to North Dover and 11 miles of 4-in. line from North Dover to East Hennessey, will handle 8,000 bbl. daily.

The first of 1,020 carloads of 36-in. pipe will be delivered this month to Alberta Natural Gas Co.'s 107-mile portion of the Alberta-California gas pipeline. Initial 20 miles of the line is being double-jointed at Yahk, B. C., and the pipe being shipped will be used on the other 85 miles of the project.

A 15-mile 36-in. main line loop will be built by Transcontinental Gas Pipe Line Corp. to bypass the reservoir of the new Cowan's Ford hydroelectric project on North Carolina's Catawba River. Duke Power Co., which is constructing the project, will pay $1,371,000 of Transco's $2,859,976 bill for the loop.

Also for Pipeliners . . .

IN THE NEWS: Two new appointments put Kennedy near a majority on the FPC (p. 80) . . . New FPC appointees, in exclusive interviews, reveal their prime interest lies with the consumer (p. 80) . . . TGT buys Pan American's Bastian Bay gas holdings (p. 86).

PLUS THIS TECHNICAL REPORT: Main-line block valves remotely controlled (p. 132).

Canada Unveils Program to Boost Oil Output

CANADA has come up with a "voluntary" oil-import-control program to help its depressed producers—and a hint that if voluntary measures fail, the government will take more drastic steps.

Basic aim of the program is to hike current output of 550,000 bbl. daily to 800,000 bbl. daily by 1963.

The plan envisions a 90,000-bbl. increase this year. Production would be boosted 75,000 bbl. daily by mid-1961.

In announcing the new oil policy program, Trade Minister George Hees told the House of Commons last week that the 800,000-bbl. target could be reached through greater use of Canadian products in domestic markets, a step-up in exports to the U. S., and substitution of imports in the Montreal area with Canadian products.

U. S. exports would be boosted by 125,000 bbl. daily, with much of the increase going to the Pacific Northwest and the remainder to the upper Midwest.

Montreal situation . . . The government did not call for a reduction of crude imports into Montreal, except as products from foreign crude refined in Montreal will gradually be displaced by the output of Sarnia and Toronto refineries.

Most of the product imports are residual fuel oil, much of which cannot be replaced using Canadian crude. And the back-out of products transferred from Montreal is to take place over a 3-year period. The 55,000 bbl. daily of imports coming into Ontario is expected to be reduced by no more than 40,000 bbl. daily by 1963.

Part of this reduction will be absorbed by expansion of the Quebec and Ottawa Valley market, which the government has left to Montreal. Thus any actual reduction of imports into Montreal will be minimized—and there may be no immediate reduction.

The government pointed out that its policy will require an increase in refining capacity in Ontario by 1963 to meet its goals. And any growth in the Montreal refining capacity will have to be based on the local market, east of Ottawa.

Main outlines of the new program were roughly what had been expected (OGJ, Sept. 19, 1960, p. 59).

Hees warned that if the oil industry doesn't cooperate to meet the 800,000-bbl. goal, "the government will take whatever further steps the circumstances may require to insure the success of its policy." This could include regulation of oil imports and exports.

Reaction of U. S. government officials to the Canadian policy statement was wary. Some Washington officials feel the impact on U. S. producers shouldn't be too great. But they figure that if the increase comes too suddenly, there might be changes in the current exemption of Canadian oil from U. S. controls.

Most majors favorable . . . The new policy statement was considered reasonable and moderate by most of the majors, although it scotched reported plans of one of them to import crude into Ontario to serve its Quebec market. But it was a bitter disappointment to western independents who have pushed for the Edmonton-Montreal pipeline.

It amounted to the government's giving the industry another 18 months or 2 years to expand markets voluntarily.

Canadian officials think the increase in production to 800,000 bbl. would accomplish the same purpose without the $350,000,000 expense of a pipeline.

Two years ago, the Borden royal commission recommended that a Montreal pipeline be considered if production failed to reach 700,000 bbl. daily by the end of 1960. However, the government never adopted this as a policy.

Three States, Delhi Merging

DELHI - TAYLOR Oil Corp.'s move to absorb Three States Natural Gas Co. faces only one more test—an okay from the latter's shareholders.

Endorsement is expected to be given at a special meeting which probably will be held early in March.

The two companies also are awaiting approval of the deal's tax provisions from the Internal Revenue Service, and approval of lease transfers on federal lands from the Interior Department.

The last major stumbling-block to the merger was pushed aside recently when Three States directors approved an exchange of stock.

One share of Delhi-Taylor will be swapped for 4.75 shares of Three States.

Delhi-Taylor would issue 1,365,526 shares for all outstanding Three States stock—indicating that the net assets of Three States are roughly $36,000,000.

What Delhi would get . . . Barring unforeseen hitches, Delhi - Taylor will boost its reserves in absorbing Three States by about 10,900,000 bbl. of oil, 355 billion cubic feet of gas, and 2,100,000 bbl. of natural-gas liquids. The reserves evaluation includes only those currently developed and those recoverable by primary methods.

Three States wells now are producing about 3,000 bbl. daily of oil and 40,000,000 cu. ft. of gas daily.

The bulk of its crude-oil production is from East Texas field, with other lesser holdings in Utah, Colorado, and Mississippi.

About 80% of its gas production is from leases in the San Juan basin.

Great Lakes Oil Firm Sold

GUSTAFSON Oil Co., which markets distillates, residual fuels, and asphalt in the western Great Lakes area, has been bought by Great Northern Oil Co.

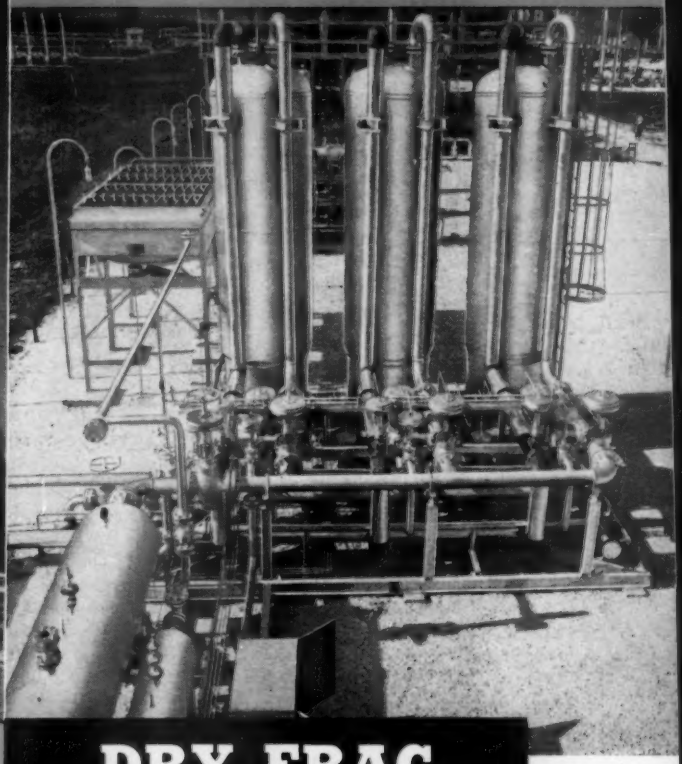
The 40-year-old Gustafson firm will continue to operate as a separate entity.

Great Northern made an outright purchase of a controlling interest in Gustafson stock and offered to buy the remainder over a period of several years.

Gustafson markets 150,000,000 to 200,000,000 gal. a year of oil products. It also has some gasoline-marketing facilities.

The company has terminals in Chicago; St. Paul, Green Bay, and Wausau, Wis., and Marquette and Escanaba, Mich.

Rich Stream -- Lean Stream



COLD FRAC **DRY FRAC**

Different processes - one objective: PAYOUT!

Although the BS&B COLD FRAC and DRY FRAC processes and equipment are entirely different, both will dehydrate gas and recover hydrocarbon liquids while operating on an unattended basis. How, then, can you determine which process will give the best results for a specific application?

Generally, the COLD FRAC process is favored for use on a stream rich in C_5+ hydrocarbons. Variable design factors such as separation temperature, partial stripping of fluid, and balancing of the process to utilize equipment to its maximum capacity greatly affect the economics of this process, but it is not affected to any great degree by inlet temperature.

The DRY FRAC process is highly effective on streams with a low C_5+ GPM. Its efficiency is less affected than that of COLD FRAC by the composition of the wellstream, but it will recover a higher percentage of available pentanes from wellstreams of lean composition.

In addition to economic factors, there are other factors including flow rate, utilities, GPM, pressure and inlet temperature which should be taken into account before a selection of the process is made.

The important point to remember is that your BS&B Man offers a complete line of gas processing equipment, and is therefore in the best position to assist you in getting exactly the right equipment on your lease.

Ask your local representative for full information or write to Black, Sivalls & Bryson, Inc., Dept. 1-A2 P. O. Box 1714, Oklahoma City, Oklahoma.

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Southwest Refinery Runs Are Starting

REFINERY runs in the five southwestern states inched up slightly in December. Throughput was 3,299,000 bbl. daily, a gain of 15,000 bbl. over November.

Although southwestern runs increased, the percentage gain was not as great as the 1.6% hike registered nationally. For southwestern refiners December runs were only 0.5% over November.

Nationally, December crude runs were 8,026,000 bbl. daily.

This was an increase of 124,000 bbl. over the previous month.

The Southwest's share of the national total declined from 41.5% in November to 41.1% in December.

Area refiners continued to operate their plants nearer top capacity, however. Average for Arkansas, Louisiana, Oklahoma, Mississippi, and Texas was 86.1% of calendar-day capacity, nationally, the average was 82.7%.

During November, Southwest refiners had maintained throughput at 85.7% of capacity, while nationally the figure was 81.5%.

December level for the Southwest was much the same as that for refineries in the Great Lakes and Mid-Continent. It fell far short of the activity maintained in the Appalachian and Minnesota-Wisconsin-Dakota regions however, where refiners operated at 95 to 98% of capacity. East Coast refineries operated at only 69.4% of capacity, while the West Coast averaged 81.2%.

ARKANSAS

(Refinery Runs in Barrels Daily)

Company and location—	December	November	December 1959
Amoco, El Dorado	31,744	30,973	30,469
Lion, El Dorado	34,302	32,680	31,966
Macmillan, Norphlet	3,532	3,880	4,270
Other	5,452	5,846	6,083
Total Arkansas	75,030	73,379	72,788

LOUISIANA

Company and location—	December	November	December 1959
Cities Service, Lake Charles	165,073	165,065	175,099
Continental, Lake Charles	53,902	51,315	54,466
Humble, Baton Rouge	261,189	273,167	336,833
Ingram, Meraux	12,999	15,829	19,232
Shell, Norco	100,626	98,288	102,292
Tenn. Oil Ref., Chalmette	37,485	42,114	21,630
Other	7,679	8,043	7,451
Total Louisiana	638,953	653,821	717,003

MISSISSIPPI

Company and location—	December	November	December 1959
Paluxy, Yazoo City	1,347	1,634	608
Pontiac, Hattiesburg	16,810	16,148	17,630
Southland, Sandersville	4,121	4,137	4,436
Total Mississippi	22,278	21,919	22,674

Squeeze on Drilling Contractors Gets Tighter

THE LUMPS which the drilling-contracting business has been taking for several years swelled some more in 1960.

Though costs remained stable, fewer rigs found work and footage prices continued to slide.

This was 1960, as reviewed last week by the American Association of Oilwell Drilling Contractors in its annual survey of drilling-contracting conditions.

Quoting Oil and Gas Journal drilling figures, AAODC pointed to a 1960 decline of 4,142 wells and 18,000,000 ft. of hole from 1959 levels.

At the same time, its survey found footage prices for rotary work declining to an average $4.11 per foot, compared to $4.33 per foot in 1959.

Less work at lower prices doesn't give the full story, AAODC claims. Even faster drilling rates during the year, it said, meant that fewer rigs were needed last year to handle the available work than would have been needed in 1959 for the same work.

The double-barreled pinch of fewer holes and lower prices has become increasingly acute since 1956, the association said.

"Distressed conditions are causing an increasing number of mergers, foreclosures, and voluntary withdrawals from the contracting business. There are serious doubts as to how much longer the industry can remain financially and physically capable of economically and efficiently satisfying the drilling requirements of U. S. oil and gas producers, if present distress conditions continue much longer."

Penetration up . . . The association study found that the average active rig in 1960 drilled 12.6 wells and 52,775 ft. of hole—both all-time record highs.

These figures compare with an average 11.8 wells and 49,233 ft. of hole per active rig in 1959, and with 10.3 wells and 41,478 ft. of hole as recently as 1953.

Costs static . . . While there was practically no change in cost of major drilling equipment items last year, the major one noted by the association was a decline.

The wholesale price index of drill collars, it said, fell 6.8 units from 102.2 in 1959 to only 95.2 in 1960.

Up Again

OKLAHOMA

Company and location—	December	November	December 1959
Allied, Stroud	2,704	1,438	2,622
Anderson-Prich., Cyril	10,048	10,883	10,703
Bell, Grandfield	6,412	6,400	6,459
Ben Franklin, Ardmore	11,197	11,590	11,541
Champlin, Enid	26,541	26,554	27,586
Cities Service, Ponca City	23,600	31,092	16,813
Continental, Ponca City	63,827	61,662	71,382
DX Sunray:			
Duncan	41,786	40,697	38,813
Tulsa	71,607	68,763	69,508
Kerr-McGee:			
Cushing	18,014	17,973	23,033
Wynnewood	17,736	18,038	5,805
Midland Co-op., Cushing	13,353	13,040	12,964
Phillips, Okmulgee	15,010	14,038	17,852
Texaco, Tulsa	28,314	28,120	31,729
Total Oklahoma	350,149	350,288	346,810

TEXAS

Company and location—	December	November	December 1959
Amoco, Texas City	98,585	109,941	93,878
Am. Petrofina:			
Mount Pleasant	14,033	13,278	13,997
Wichita Falls	3,437	6,059	7,820
Atlantic, Port Arthur	67,464	63,785	63,850
Col-Tex, Colorado City	7,544	7,701	11,265
Continental, Wichita Falls	11,506	6,770	10,928
Cosden, Big Spring	28,972	28,650	23,750
Crown Cent., Houston	33,384	33,601	33,945
Delhi-Taylor:			
Corpus Christi	40,941	40,706	33,158
Port Isabel	5,304	5,512	6,861
Eddy, Houston	2,054	2,110	2,184
El Paso, Odessa	11,546	12,664	10,546
Gulf, Port Arthur	266,472	277,158	262,046
Humble, Baytown	281,907	266,774	292,607
La Gloria, Tyler	16,683	16,361	15,652
Mobil, Beaumont	184,106	196,294	171,910
Phillips:			
Phillips	54,295	55,050	68,366
Sweeny	66,489	60,842	79,322
Pontiac, Corpus Christi	50,266	47,918	46,320
Premier:			
Baird	2,015	3,197	1,894
Fort Worth	7,680	5,555	7,754
Longview	4,645	3,355	4,324
Pure, Nederland	77,075	72,513	76,126
Republic, Texas City	27,105	24,033	26,816
Shamrock, Sunray	24,289	20,451	19,963
Shell, Houston	101,689	100,197	106,492
Signal, Houston	49,002	49,399	54,216
Sinclair:			
Corpus Christi	28,712	27,966	31,527
Houston	131,561	122,221	132,479
Skelly, Longview	3,056	2,231	3,166
Southwestern, Corpus Christi	30,738	29,147	36,742
Stand. Tex., El Paso	45,474	44,196	51,672
Suntide, Corpus Christi	40,987	39,703	43,821
Texaco:			
Amarillo	15,500	14,981	13,172
El Paso	9,985	9,869	10,434
Port Arthur	260,054	265,867	244,389
Port Neches	36,548	41,688	41,148
Texas City, Texas City	32,886	29,516	25,765
Other	25,257	27,088	17,506
Total Texas	2,199,206	2,184,347	2,197,781

Only other changes noted were slight increases in the prices of combination hooks, rotary slips, and slush pumps. Source for these cost figures was the U. S. Bureau of Labor Statistics.

Of total drilling last year, the AAODC survey found that contractors handled 95%—up 1% over 1959. This figures out to 44,413 wells and 181,167,000 ft. of hole.

FOOTAGE PRICES FOR U. S. ROTARY DRILLING
(Exclusive of day-work charges)

Year	Avg. price per foot (dollars)	Avg. depth per hole (feet)
1957	4.51	5,831
1958	4.27	5,535
1959	4.33	5,876
1960	4.11	6,124

Source: AAODC.

Reed, Dresser Merger Looms

IF THE OWNERS of 80% of Reed Roller Bit stock approve, the Houston oil-tool-manufacturing company will be absorbed by Dresser Industries of Dallas in a $12,600,000 stock-exchange deal.

Reed's president and chairman, Ray O. Shaffer, said last week that a dozen or so shareholders who own 60% of the stock have indicated their willingness to vote for the plan. Shaffer anticipates no difficulty in getting the required 80%.

Dresser would acquire Reed's assets and assume its liabilities by issuing 477,050 shares of common stock, the equivalent of issuing 7 shares of Dresser stock for 10 of Reed's. The Reed stock is selling for approximately $17.

Shaffer said that if the deal goes through the company will continue in the rock-bit business and the Houston plant will remain open. Just how the consolidation will be effected, however, won't be determined until later.

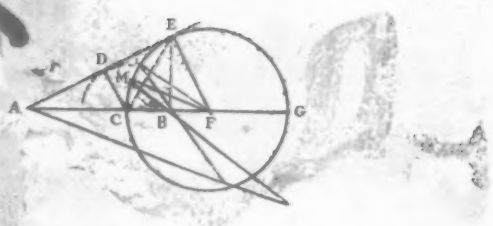
Dresser's Security Engineering Division manufactures the Security bit, which has competed with Reed for the No. 2 spot behind Hughes Tool Co., leader in the field. Reed also makes tool joints and drill collars—items which Security does not manufacture.

Reed's shareholders will vote by mail on the stock-exchange proposal, and this will require nearly 2 months. Directors of both companies have approved the plan. Dresser's shareholders are not required to vote.

THE QUALITY OF THINKING

The mind of Galileo—keenly analytical, superbly trained—led him to founding the science of experimental physics, which, centuries later, is revealing the mysteries of space. It is self-evident by his achievements that Galileo's mind reached a level of quality far above ordinary standards of excellence.

Within the same area of meaning, the quality of minds responsible for an engineering project can be evaluated only by results. When you check the record of Brown & Root's engineering through the years, the high quality of thinking reveals itself. Customer satisfaction from greater efficiency at lower costs has built a worldwide reputation for engineering and construction by Brown & Root.



"The knowledge of a single fact through a discovery of its causes prepares the mind to understand and ascertain other facts..."
Galileo

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Automation Guides Inventory, Output

A HOUSTON oil equipment manufacturer has put together an automated data processing system that keeps inventories up-to-the-minute on 15,000 items, eliminates mountains of paperwork, and affords faster customer service.

Mission Manufacturing Co. has just finished designing its entire administrative operation around IBM's 305 Ramac and other electronic equipment.

Here, specifically, is what the system does:

. . . Updates inventories three times daily on every item in the plant.

. . . Automatically issues a reorder, when an item is depleted.

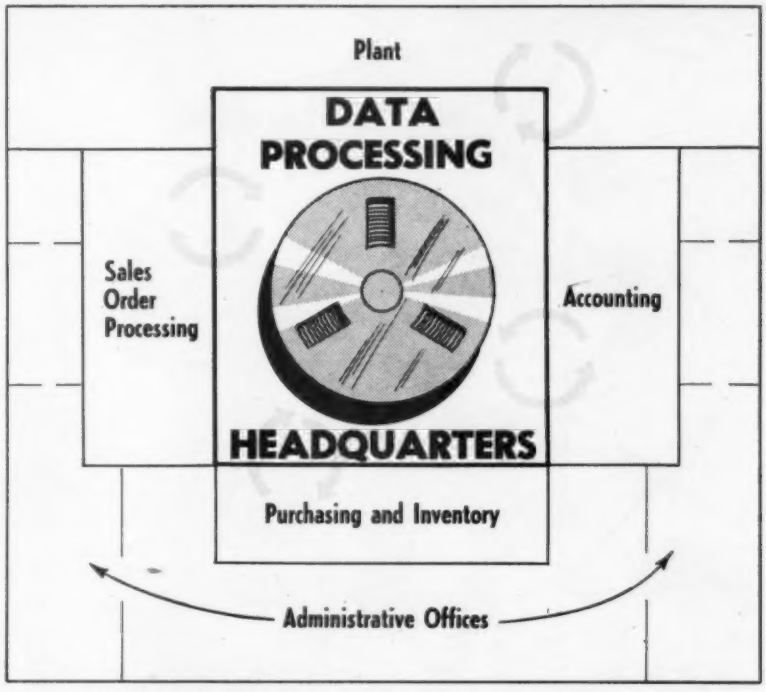
. . . Supplies a work schedule to the shop that keeps inventories current.

. . . Tells a customer in seconds whether an item is available for immediate delivery.

. . . Combines the bill of lading, the packing sheet, and invoice in one writing instead of three.

. . . Provides Mission with a daily cost analysis on each item as well as the entire day's cost operation.

. . . Eventually the system will report daily on the cumulative status of budget spending and provide a gross profit-and-analysis statement.



DATA MOVES IN AND OUT of Mission Manufacturing's new processing headquarters in continuous flows, providing more speed than the old straight-line system.

How and why . . . When Mission built its present plant northwest of Houston 2 years ago, it intended to erect a separate administration building.

But the need for close cooperation with the plant in handling orders and replenishing inventories changed management's thinking.

After a 6-month system study, management at Mission decided to construct administrative offices in a 3-sided complex directly connected with the plant and install the 305 Ramac in the center.

The company thus could save time, operate more efficiently, and accomplish the inventory control it was seeking.

This is what Mission has done. And last week the new system was at work.

Instead of moving data in an ordinary straight-line operation, the system processes it in circles—in and out of the data processing control headquarters (drawing). Swift and accurate, the system can be refined further, as experience grows, to do the job even better.

The process . . . George Willis, administrative services manager, describes what happens when the system moves into operation:

A customer calls in an order for 5½-in. liners. The order-taker, using the same phone, calls the operator of a "remote inquirer" machine to find out if the liners are in stock. The machine checks a punch-card inventory that is updated three times a day, and types out the quantity of 5½-in. liners in stock. This requires less than 5 seconds.

The order-taker then assures the customer the liners are available for immediate delivery. He sends the order directly into the warehouse for filling, and an IBM punch card is prepared for the Ramac machine.

Ramac sets the wheels in motion to keep liner inventory up to date. It records the quantity still in stock and, if more are needed to meet a preset inventory requirement, it orders the number to be manufactured and the materials required.

The machine, in gathering data on all items which must be manufactured, can plan a 2-week work schedule showing the quantities of products, by department, to be turned out. Also, twice a day, it will schedule work for an 8-hour period.

Other functions . . . To keep Mission informed on its sales progress during the month, Ramac keeps running totals on each item sold.

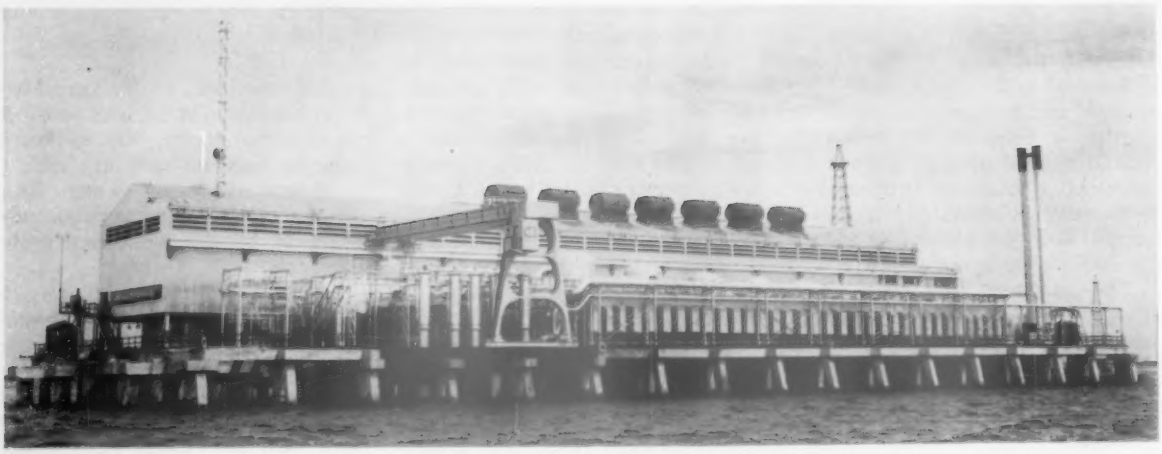
Ramac will be put to work later by the company's research department to handle engineering problems.

Another down-the-road service will be a refinement to simplify customer billing. Ramac will do the billing by punch card, send a duplicate to the customer for use in his own punch card equipment, and thus eliminate several steps in the billing and payment process for both manufacturer and customer.

PHOTOS IN THE **NEWS**

Old Derrick Burns

ONE OF THE FEW wooden derricks left in California's Signal Hill oil field crashes in flames during a fire of unknown origin. The derrick, one of 25 in the field, stood over an abandoned well on a Venture Oil Co. lease. When it fell, a beam punctured a Signal Oil & Gas Co. crude tank and the oil ignited. But firemen quenched the tank fire before it caused major damage.



Huge Maracaibo Plant

CREOLE'S new Lake Maracaibo conservation plant is on a 1-acre platform. The plant, Bachaquero 1, can inject 150 million cubic feet daily.

New African Wildcat

STRATIGRAPHIC drilling is under way on Walu 1, Kenya, as part of a joint exploration program by BP-Shell Petroleum Development Co. The test is on a seismic structure near the Tana River, a few miles from Galole.

Hanging Building

BP'S NEW building will hang from steel cables attached to cantilevered beams at the top. The structure is being built by BP Belgium in Antwerp.

First in Fair

THE NATION'S gas industry is the first exhibitor to contract for space at the 1964-65 New York World's Fair. John E. Heyke, right, president of Brooklyn Union Gas, presented the first rental check to J. Anthony Panuch, Fair official.

OKLAHOMA OPERATOR ESTIMATES $7,000 SAVINGS ON 19,600-FOOT WORKOVER!

And the Service Contractor made a fair profit, too!

"This modern drive-in rig saved us almost $200 per day on day work costs, plus $1,000 on moving and rig-up costs," says Mr. Jack Ross, Production Superintendent for Kenneth A. Ellison. "We waited over two weeks for the rig we wanted, a Cardwell KM250. We'd watched these rigs closely for several months and had no doubts about putting one on this tough job. The KM250 is as fast as any conventional drilling rig normally used for this deep work, and it's much more economical. On this job, the KM250 proved its superior performance and overall job economy. Because of this, we'll be using this rig a lot in the future."

The job was performed on the Miller-Long #1, which was originally drilled to 19,634 feet. On the last trip out of the hole, the 19,600 feet of pipe was pulled and on the bank in just over 8 hours, including time to change elevators. There were no breakdowns on the job which lasted 31 days, including moving, rig-up and rig-down time.

More and more operators are finding that Cardwell Drive-In Rigs save them time and dollars on completion, servicing and workover, and perform outstandingly on medium depth drilling. Contractors who own Cardwell Drive-In Rigs are continually meeting the challenge of tougher, more complex jobs, and still making a good profit for themselves. You can, too! Call a Cardwell representative today!

Mr. Jack Ross,
Production Superintendent,
Kenneth A. Ellison.

for tomorrow's equipment—see Cardwell today!

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Five Big Gas Wells Completed in South Texas

GIANT GAS WELLS are having a "field day" in South Texas.

In quick succession, five wells with potential flows in the neighborhood of 100 million cubic feet daily have been completed at widely scattered points.

These are by no means the biggest wells ever completed in South Texas. Wells with potential flows of 100 to 200 million cubic feet daily are not uncommon in the region, which has prolific gas reserves. Some wells have had potential flows ranging up to 850 million cubic feet daily.

However, five big wells in a few days sets some kind of a record.

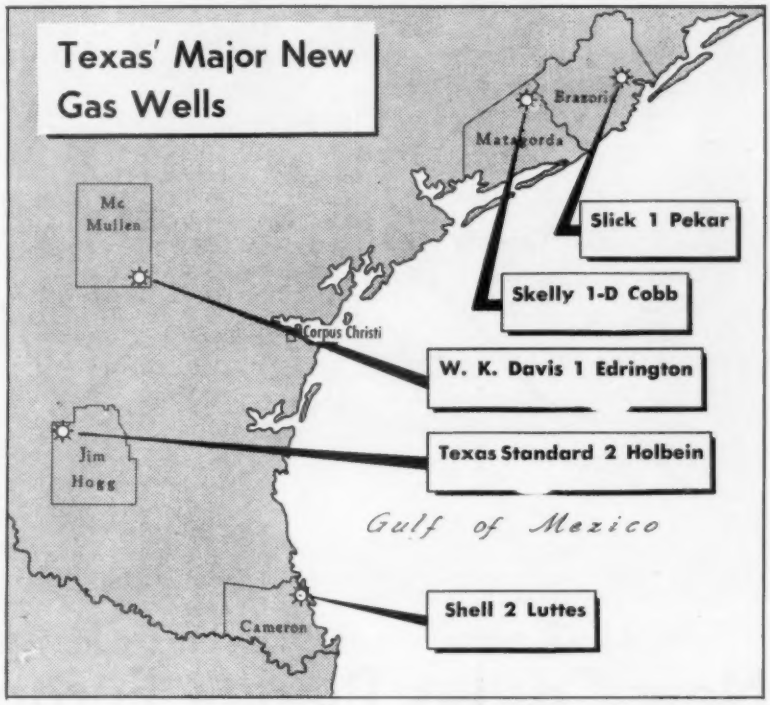
Combined potential flows of the wells total 567 million cubic feet daily.

Although the fifth well is the baby of the bunch, it is the largest well ever completed in its sector of the coast — meagerly prospected Cameron County.

Two of the five wells are wildcats which opened new fields. They are Slick Oil Corp. 1 Pekar, Brazoria County, 117 million cubic feet, Frio sand, 9,947-61 ft.; and William K. Davis 1 Edrington, McMullen County, 120 million cubic feet, Wilcox-Luling sand, 7,761-66 ft.

Two others are in previously known productive areas. These are Skelly Oil Co. 1-D Cobb, Bay City field, Matagorda County, 131 million cubic feet (two zones), Frio sands, 8,253-59 ft. and 8,328-34 ft.; and Standard Oil Co. of Texas 2 Holbein, Northeast Thompsonville field, 129 million cubic feet, Wilcox sand, 9,493-9,566 ft.

The Cameron County well is Shell Oil Co. 2 Luttes, Miocene sand, 6,564-72 ft. It is a 2-mile extension of the Luttes field which was found less than a year ago.



INDUSTRY BRIEFS . . .

A proposed merger of Consolidated Oil & Gas Co., Denver, and Midland Oil Co., Cheyenne, will be voted on February 15 by stockholders of both companies. Midland Oil will be merged into Consolidated if the proposal is approved.

A bill to hike taxes on oil and gas has been passed by the Utah Senate and legislators expect it to win approval from the House and Gov. George D. Clyde. The proposal, which would boost the oil and gas tax from 2 to 5% of value at the well, is aimed at raising an extra $3 million per biennium.

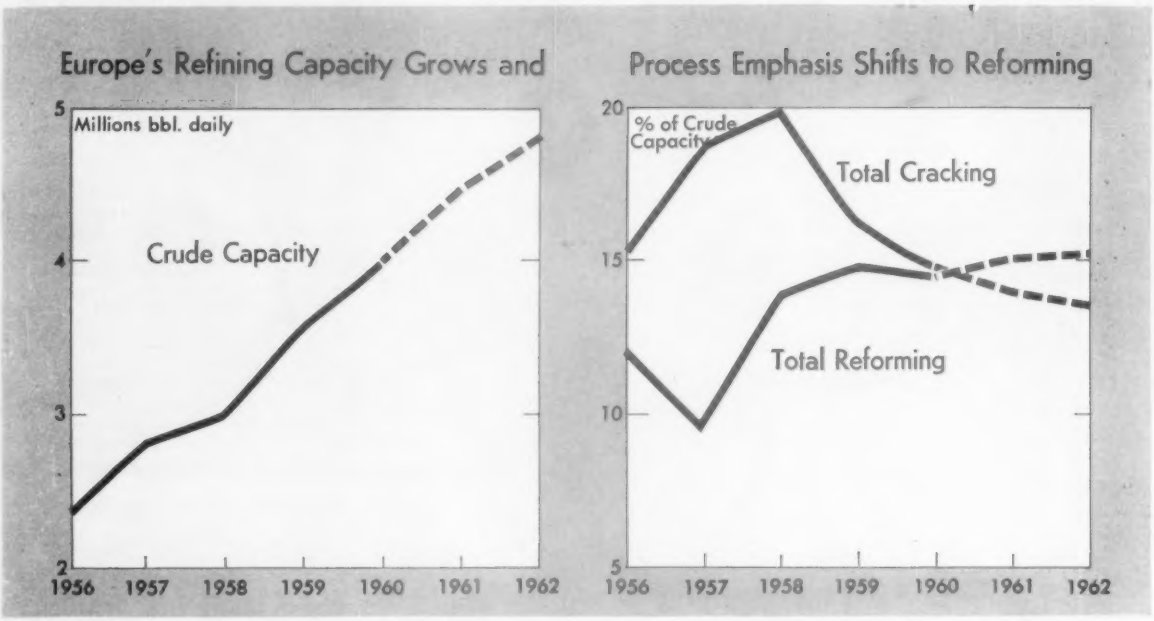
Leaching of a sixth LPG well in the Sorrento, La., salt dome 35 miles from Baton Rouge is being carried out by Humble for propane storage. The leaching will continue until the well has a capacity of 400,000 bbl., boosting Humble's Sorrento storage to 1,900,000 bbl.

Research in instrument systems will be performed in a new laboratory of Dow Chemical Co. The lab is being formed to assist all Dow groups with problems relating to instruments and their application. Major emphasis will be on process instrumentation. The lab will be located at Midland, Mich.

Charter rates for clean fuel on the Gulf-East Coast run set new highs on successive days last week. Charters were fixed at ATRS plus 48¾, plus 50 and plus 55, each one a new high since the Suez closing of 1956-57. The highest rate equals $4.42 per ton.

Merger of Breuer & Curran Oil Co. and Alco Oil and Gas Corp. has been announced. Operations will be combined under the Alco Oil and Gas name. The merged company will operate more than 150 wells and have more than 23 million acres, domestic and foreign, under leasehold or concession.

Purchase of 15 wells from Western Drilling Co., Lubbock, has been made by Stanton Oil Co., San Antonio. Stanton earlier bought 19 Western wells in Levelland field, Cochran County. The newly acquired wells are in Levelland field, Anton-Irish field (Lubbock County) and Sunniland field (Lynn County).



New Crudes Plague European Refiners

• Their old yield problem of too much gasoline and not enough middle distillates is aggravated by two trends: Demand for distillates is growing and African crudes now coming in are higher gravity.

George Weber
Editor

EUROPEAN refiners are coming to grips with a squeeze play. Two primary factors are making it more difficult to balance product yields with demand on that continent.

On the one hand, middle distillate and even residual fuel consumption is growing at a faster rate than gasoline. On the other, the crudes available to European refiners are becoming lighter in gravity.

The result is a marked trend toward reducing gasoline yields while maximizing middle-distillate output and holding residual yields about constant. This is nothing new. For the past two decades the trend has been in that direction. But the rapid influx of light African crudes this year will accentuate the problem.

European refiners 20 years ago converted about 30% of their crude to gasoline. This yield shrunk to about 24% in 1949 and to less than 21% last year. The decline is almost exactly offset by middle-distillate yields which grew from 8% in 1938 to 20% in 1959. Residuals have remained essentially static on yield, with demand growth paralleling over-all increase in all products.

The end of this trend is not yet in sight. Gasoline yields are expected to retreat still further to less than 20% before the possibility of other factors exerts a reversal.

The market . . . The de-emphasis in gasoline stems from a market far different from that in the U. S.

In Europe, the greatest demand has been enjoyed by tractor fuel, diesel fuel, kerosine, jet fuel, and now even distillate burning oils for space heating. Gasoline requirements have grown, but at a much slower pace. Universally high gasoline taxes have encouraged Europeans to resort to bicycles, motor scooters, and at best to light high-mileage cars.

An influx of gas to some areas of Europe, coupled with a hoped-for reduction in the crushing gasoline tax, may in time reverse this trend. Meanwhile, refiners are resorting to various means of adjusting yields on crudes which are becoming lighter and lighter in gravity.

Reformer feedstocks are being cut by lowering the end point of straightrun naphtha charged to cat reformers. On average, the straightrun gasoline yield is now down to about 15% of crude by cutting end points as low as 320° to 340° F. It is possible to add this increment to the middle-distillate range because of a substantial market for tractor fuel and a growing demand for wide-boiling-range jet fuel.

Petrochemicals are absorbing some naphtha but the volume is not significant. Light fractions from cracking operations are more suit-

able as petrochemical building blocks.

Another recourse for refiners lies in hydrocracking. This process is being considered in Europe, although no refiner has yet contracted for a commercial unit. The new technique is being applied in the U. S. for the first time this year. Three units are under way to convert middle-distillate fractions to high octane gasoline.

In Europe, hydrocracking will serve another purpose. It will convert heavy petroleum fractions to middle distillates. Catalytic and thermal cracking have handled this conversion for many years. But they no longer fill the needs of European refiners.

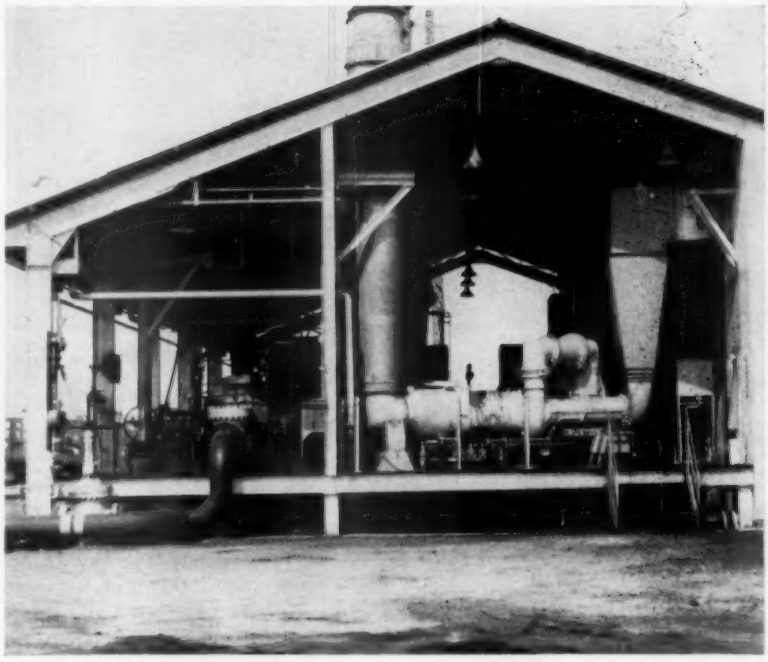
Catalytically cracked vacuum distillate yields twice as much gasoline as middle distillate. Hydrocracking, on the other hand, yields middle distillate and gasoline in a three-to-one ratio. The quality of both products is higher; and the yields, because of hydrogen addition, amount to more than 100% of feedstock.

Slow change . . . Hydrocracking is a process for Europe's future.

Even in the U. S. where the less severe and less costly type of process makes it more economic, commercial adoption is barely beginning. It will take longer for Europe to justify it.

For the past several years, catalytic cracking has lost its original favor in Europe. This is evident in the rare instances of new construction, in the face of a burgeoning growth in other processing capacity. The building of new cat crackers all but ceased after 1958.

Catalytic reforming has shown steady growth. It has largely replaced Europe's dependence on thermal reforming. Nearly every modern refinery now has cat reforming, and little thermal reforming capacity is used today. European refiners operate with higher severity in many cases than U. S. refiners, and rerunning of reformate is practiced to a greater extent in Europe. The reason: Reformer feeds are generally less naphthenic and more difficult to convert to a highly aromatic product. Under no pressure to boost gasoline output, the European refiner is able to process the naphtha fraction for higher octane and lower product yield.



PUMPING center at Khursaniyah where . . .

Aramco Finds Turbine Pumps Reliable

GAS-TURBINE pumps which operate on a variety of fuels have shown their reliability in remote operations for Arabian American Oil Co.

Aramco, in fact, has installed 11 of the 1,260-hp. Ruston "TA" units for crude-oil pumping duties at three of its Saudi Arabian installations.

Reliability of the units has been proved by long hours of continuous operation for some of the units with only a minimum maintenance. Add to this the simple building needed to house the gas turbines and their attractiveness is enhanced.

Aramco has five turbines installed at its Safaniya pumping center, the first suction station to start operation. The units are fueled on natural gas produced in association with crude oil from offshore Safaniya.

Four turbines are installed at Khursaniyah operating on crude oil produced from nearby fields, and two units are at the Nariya pumping station where the fuel is crude oil from the Trans-Arabian pipeline.

Pakistan Asks Reds (and Allah) for Help

PAKISTAN remains doggedly determined to find oil—Allah willing.

The traditional supplication of Moslem faithful — "Inshallah", or Allah willing—was invoked by Zuifiqar Ali Bhuttom, Pakistan minister of fuel, as he summed up the status of negotiations with Moscow over exploration aid.

Pakistan is the latest country to receive offers of Russian exploration aid. The Pakistani minister said he expects to wind up an agreement within 3 months, after negotiating one more point.

The minister did not spell out the form the proposed aid would take. But he said Russia is willing to supply as many technicians as Pakistan may ask for, and offers the aid without strings attached.

In neighboring India, a government oil and gas commission has found oil in the Cambay area with the help of Russian and Romanian technicians and gear. The commission is government-controlled.

The Russians say they are confident of finding oil in Pakistan. Bhuttom shrugs off any fears of letting Russian technicians enter the country. The government's position is that private Western firms are not finding oil, and there is no harm in letting the Russians try their hand.

JARVIS LOWRY PROUDFIT

Jarvis Takes Creole Helm

HARRY A. JARVIS has been elected president of Creole Petroleum Corp.

He succeeds Arthur T. Proudfit, who resigned last week as president. Proudfit will continue as a member of the Creole board of directors until March 1, when he will retire.

Leo E. Lowry was named executive vice president, the position formerly held by Jarvis.

Creole is the leading crude producer in the Jersey Standard group, and the biggest oil company in Venezuela. Its crude production averages about 1,100,000 bbl. daily, and it operates a 345,500-bbl. refinery at Amuay and a 68,000-bbl. refinery at Caripito.

Jarvis came to Creole 14 years ago from Argentina, where he had served 16 years with another Jersey affiliate. He became the first manager of Amuay refinery in 1947.

Two years later he was named manager of Creole's refinery department, and in 1950 became a member of the company's management committee. He was elected to the board in 1952 and became executive vice president in 1954.

Lowry is a specialist in finance. He has held a series of positions in the comptroller's department in his 22 years with Creole, including the post of comptroller. He became a member of the board in 1953.

Proudfit has been engaged in the oil business in Venezuela for almost 30 years. He went to the country for the first time in 1927 from Mexico, where he worked 8 years with another Jersey affiliate.

In 1936 he joined the Argentine affiliate for 2 years as production superintendent. He became manager in Venezuela in 1942 and served as Creole president between 1945 and 1954, when he became a member of the Jersey Standard board.

He was named Creole president for the second time in February 1959, a time of tension between the oil company and the government because of a surprise increase in income taxes levied late in 1958. He has served in the post since then.

Australian Refinery Planned

STANDARD Oil Co. (Ind.) has established a subsidiary in Australia to carry on petroleum refining and marketing operations in the commonwealth.

The company is Amoco Australia, Ltd., with headquarters in Sydney.

Indiana Standard President John E. Swearingen said that Amoco Australia plans to build a refinery near Brisbane with an initial crude capacity of 15,000 bbl. daily.

FOREIGN BRIEFS . . .

A carbon black plant with a capacity of 20 million pounds per year will be constructed in Valencia, Venez., by United Carbon Co., Manufactura de Papel, Inversiones Dosco, and Grupo Tecnico de Promocion Industrial. Export - Import Bank has granted a $1.4 million credit for the project. Contractor is Lummus Co.

The first wildcat ever drilled in northern Chile has been started by the government oil agency, ENAP, in the Salar Pintados area, 50 miles inland from Iquique. A second northern wildcat will be drilled in the Salar de Pedernales area.

A Mene Grande farmout in Barinas, Venez., has been taken by Caracas Petroleum, a subsidiary of Ultramar Co. The deal gives Caracas Petroleum a majority interest in 4,275 hectares (about 10,550 acres). Mene Grande retains a 2½% override.

A combination crude-distillation and thermal-cracking unit, now on stream, has boosted capacity of the Gerwerkschaft Erdoel-Raffinerie Deurag-Nerag plant at Misburg, West Germany, from 20,000 to 30,000 bbl. The Lummus-built unit produces petroleum coke and is designed for maximum diesel-oil yield.

Beach unloading will be used in the delivery of three large boilers and other heavy gas-plant equipment en route to Tierra del Fuego from Houston. The Babcock & Wilcox equipment will be used in a plant being built by the Chilean oil agency, ENAP.

Russia's deepest well has been completed at 16,400 ft. from a steel platform in Neftyanye Kamni offshore field in the Caspian Sea. It is also claimed that the well is the deepest ever drilled with a turbodrill.

An automatically controlled catalytic cracker, Romania's first, has been put on stream at Onesti refinery. The unit's capacity is about 5,000 bbl. daily.

Marketing in Ecuador is about to be started by a Mobil International affiliate, Mobil Oil Co. del Ecuador. The company will market lubricants and related products, with a head office at Guayaquil, and a district office at Quito.

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U. S. Lifts World Flow

- Domestic output pushes free-world production to 21,549,200 bbl. daily in November.

U. S. OUTPUT was responsible for an over-all gain in free-world crude production in November for the first time in many months.

Domestic operators increased output by 175,000 bbl. daily to 7,133,000 bbl. daily, the highest level in 9 months. Total production in other areas decreased 140,300 bbl. daily.

The Middle East was down 148,400 bbl. daily, with the four major oil countries—Iran, Iraq, Saudi Arabia, and Kuwait—producing less crude. Venezuelan output was off 73,000 bbl. daily.

Continuing gains in Argentina and the French Sahara remained the most significant changes in the foreign producing picture. Crude moving to the Mediterranean via pipelines from Hassi Messaoüd and from CREPS' Algerian fields approached 300,000 bbl. daily. Argentina, with the help of an increasing volume of crude produced under contract by private operators, is well over the 200,000-bbl.-daily mark.

TREND OVER THE LAST YEAR

(Thousand of barrels)

	Western Hemisphere less U. S.	Middle East	Total free world outside U. S.
1959			
November	4,116.3	4,821.6	9,904.5
December	4,218.5	4,682.0	9,861.5
1960			
January	4,316.5	5,065.3	10,334.7
February	4,389.5	4,986.5	10,313.2
March	4,156.4	5,146.3	10,346.8
April	4,069.5	4,925.5	10,055.1
May	4,317.4	5,286.2	10,680.2
June	4,285.4	5,164.5	10,568.2
July	4,214.2	5,103.5	10,448.3
August	4,320.1	5,146.8	10,602.5
September	4,311.3	5,500.2	10,941.3
October	4,243.9	5,630.6	11,104.5
November	4,206.8	5,482.2	10,964.2

World-Wide Crude Production: Daily average in thousands of barrels

Country—	Nov. 1960	Oct. 1960	Nov. 1959
Western Hemisphere			
Argentina	210.0	205.1	128.6
Bolivia	8.2	9.2	9.0
Brazil	88.1	88.1	68.8
Canada	520.0	490.3	477.5
Chile	20.0	19.5	18.8
Colombia	158.1	155.9	145.3
Cuba	0.2	0.2	0.5
Ecuador	7.7	7.7	7.1
Mexico	284.1	284.1	260.3
Peru	50.0	52.0	50.0
Trinidad	122.7	121.1	115.8
Venezuela	2,737.7	2,810.7	2,834.6
Total	4,206.8	4,243.9	4,116.3
Europe			
Austria	45.1	45.1	45.9
France	39.5	40.8	34.9
West Germany	111.3	108.0	104.5
Italy	38.7	38.7	37.1
Netherlands	38.7	38.7	33.8
United Kingdom	1.7	1.7	2.0
Yugoslavia	33.0	33.0	12.4
Total	308.0	306.0	270.6
Middle East			
Bahrain	45.1	45.1	45.2
Iran*	1,167.0	1,208.0	995.0
Iraq†	989.6	1,045.9	907.8
Israel	2.7	2.7	2.0
Kuwait	1,649.2	1,678.2	1,370.1
Neutral Zone	135.0	135.0	122.4
Qatar	161.8	183.2	161.1
Saudi Arabia	1,325.4	1,326.1	1,210.3
Turkey	6.4	6.4	7.7
Total	5,482.2	5,630.6	4,821.6

Country—	Nov. 1960	Oct. 1960	Nov. 1959
Other Asia			
British Borneo	93.1	93.1	108.5
Burma	10.5	10.5	10.2
India	8.5	8.5	8.5
Indonesia	434.8	433.5	390.8
Japan	10.6	10.6	8.8
New Guinea	4.5	4.5	4.5
Pakistan	5.9	5.9	7.0
Total	567.9	566.6	538.3
Africa			
Algeria	294.5	253.5	63.9
Angola	1.2	1.2	1.2
Egypt	66.0	66.0	61.6
Gabon	15.4	15.5	14.8
Middle Congo	1.9	1.9	...
Morocco	2.0	2.0	2.2
Nigeria	19.3	19.3	14.0
Total	400.3	357.4	157.7
Free World			
Foreign	10,965.2	11,104.5	9,904.5
United States	7,133.0	6,958.0	6,982.0
Total	18,098.2	18,062.5	16,886.5
Communist Countries in Soviet Orbit			
Romania	231.0	231.0	229.0
Russia	3,120.0	3,120.0	2,688.0
Other Communist	100.0	100.0	100.0
Total	3,451.0	3,451.0	3,017.0
WORLD TOTAL	**21,549.2**	**21,513.5**	**19,903.5**

Figures are from reliable industry reports or government sources. Estimates are made where complete reports are lacking. *Includes estimated 6,000 bbl. daily from Naft-i-Shah field not operated by Consortium companies. †Includes estimated 3,500 bbl. daily from Naft Khaneh field, operated by Iraq Government.

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SECURITY does it again! The newly developed, exclusive nail-lock for retaining jet nozzles, is unmatched in the industry. This years-ahead design eliminates undependable, old-type snap ring retainers. The nozzle can't come out!

Plus feature: Nail is easily removed to change nozzle sizes. Less down time is assured because of deleting old-type snap-rings which are often lost through erosion . . . faster hole results!

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*Patent pending

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Part of apparatus used in continuous quality control on Mobil Sorbead R. Humidified air, or gas charged with condensable hydrocarbons is passed through the desiccant in the U-tube, permitting measurement of a desiccant's adsorption capacity. Small photo: This pilot plant is used by Mobil research in continuing desiccant development work. It duplicates in a greatly simplified way the manufacturing process of Mobil's Sorbead production facilities.

MOBIL SORBEAD R

A superior desiccant that increases gas drying efficiency... reduces gas drying costs... with no additional capital investment!

If you operate a gas drying or hydrocarbon recovery plant...

A MESSAGE OF IMPORTANCE FROM MOBIL:

To help you increase gas drying efficiency . . . reduce gas drying costs—with no additional capital investment—Mobil offers a superior solid desiccant for pipeline compressor stations: Mobil Sorbead R.

Here's how you may benefit with this exceptional desiccant:

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Mobil Sorbead R permits you to establish longer-than-usual drying cycles because of its high break-point capacity. Or, if existing cycles are maintained, the gas flow rate can be increased without additional capital investment. Using Sorbead R, one plant increased its capacity from 240 mmscfd to over 400 mmscfd in this way. In addition, Mobil Sorbead R has a higher bulk density than granular desiccants, permitting a greater weight to be packed into a given unit. Thus, unit capacity may also be increased.

Reduced regeneration costs

Mobil Sorbead R is easily regenerated by heating to a temperature of 300°-500° F., permitting substantial savings in regeneration fuel costs as compared to desiccants requiring higher regeneration temperatures. And the high break-point capacity of Sorbead R permits longer usage before regeneration, extending gas drying cycles and further reducing regeneration fuel costs. One company dehydrating 100 mmscfd natural gas is saving over $4000 a year in regeneration fuel costs with Mobil Sorbead R.

Longer desiccant service life

Mobil Sorbead R maintains a high break-point capacity over several years . . . has a much longer service life than other widely used desiccants. Consequently it requires less frequent replacement, with resultant operating economies.

Lower sales-gas dew points

With Mobil Sorbead R it is possible to maintain low gas dew points even after long service periods. One company with a sales-gas dew point requirement of -20° F. had to flare gas not meeting this requirement before changing to Sorbead R. This superior Mobil desiccant has enabled this company to consistently maintain the required dew point.

Reduced desiccant attrition

Because of the unusually high mechanical strength and spheroidal shape of Sorbead R, this solid desiccant resists dusting and attrition in shipment and use. These factors also mean that Sorbead R presents minimum resistance to gas flow through the bed, keeping pressure drops very low throughout its service life.

And because Sorbead R resists attrition, it will not dust and cake in service. This prevents channeling and consequent by-passing of the desiccant by the gas, which can substantially reduce unit efficiency.

Efficient hydrocarbon recovery if desired

Sorbead R has a very high capacity for hydrocarbons as well as high bulk density and is exceptionally effective in the recovery of valuable condensable hydrocarbons when used for this purpose. A typical 20 mmcfd unit can produce up to $50,000 per year in additional revenue through such recovery, using Mobil Sorbead R.

★ ★ ★

Through bulk plants, blending plants and refineries spanning the length and breadth of the United States, Mobil is prepared to make prompt shipments of Sorbead R and top-quality lubricants. Also available to Mobil customers is the expert help with lubrication problems and the technical assistance of Mobil's many engineers and industrial Representatives, always on call to help you with problems.

For complete information on Sorbead R and Mobil's nationwide service, call your nearest Mobil Representative. Or write, Mobil Oil Company, 150 East 42nd Street, New York 17, New York.

Mobil

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For strength
... economy
... versatility

THE SLOTS IN THIS FORGING SAVED OUR CUSTOMER SEVERAL MINUTES MACHINING TIME

The slots in the part above used to be machined. That took time and tools. It was expensive—*needlessly*.

Now, at Bethlehem's suggestion, the forged part is trimmed along the parting line, then placed in a special fixture in the trimming press where the slots are hot-broached.

The hot-broaching involved a small additional tooling cost. But, now there's no more machining . . . No more wear and tear on machine tools . . . No more waste metal. Take our customer's word for it, his savings more than make up his slightly higher tooling costs.

Our sales engineers will be happy to take a fresh look at your forgings, to talk over your ideas and problems. Perhaps they can help you cut machining costs, too. We suggest that you get in touch with our nearest sales office.

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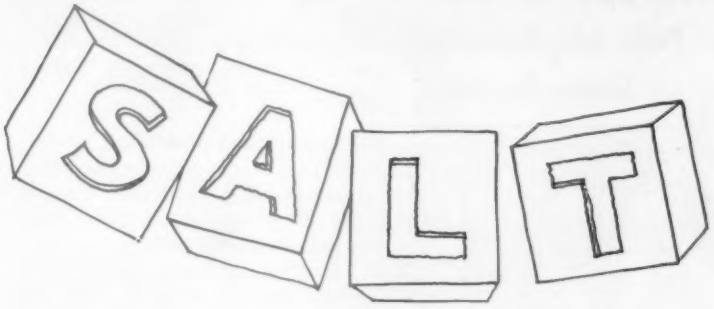
BETHLEHEM STEEL

BETHLEHEM STEEL

Think you've got troubles? Here are some tough problems that Rocky Mountain operators have licked as



BY W. B. BLEAKLEY
Production Editor

. . . plagues Montana production

East Poplar field, Montana, has lots of production problems. And most of them are due to one thing—salt. Produced water from most of the field is saturated, and precipitated salt can plug up the tubing in a hurry. Here's how Murphy Corp. personnel have met each problem.

EVERY OIL OPERATOR has had his share of salt-water trouble. Salt water increases lifting costs, causes a lot of workovers, and is an expensive thing to be disposed of.

But only a few operators have had the troubles of Murphy Corp. in its operation of East Poplar field, Roosevelt County, Montana. Fresh water is being dumped in the wells, flow lines are pigged every day, produced water salinities are checked regularly, but there is no stopping the invasion of salt into the productive Madison B zone.

And it really is an invasion. But more about that later.

East Poplar anticline is productive in the Madison formation. The Madison is made up of series of porous zones that are known to be interconnected in various areas of the field. The salt bed in question is located about 50 ft. above the main zone of porosity (B zone) in the Madison formation. This salt bed varies in thickness up to 40 ft., and is not present in some areas of the field.

The original water - oil contact varied from —3,760 to —3,560 ft., deepening to the north over the entire 6½-mile length of the field. This tilting water table is believed to be due to the hydrodynamic effect of water movement around the structure. The Madison formation outcrops in the Snowy and Little Rocky Mountains in South-Central Montana, southwest of East Poplar field.

Several dry holes have been drilled west of the field, just outside the oil-water contact. On penetrating the Madison, operators found that all of the pore space was filled with crystalline salt. This is also the case on the essentially nonproductive West Poplar anticline, several miles west of East Poplar field.

Here's the problem. When the field was first put on production, formation water from the wells on the west side of the field was much more saline than that in other parts of the field. As time went by the situation got worse, and started showing up as a coating on the inside of the tubing and flow lines.

Before long the flow lines would be completely plugged unless the salt was removed periodically.

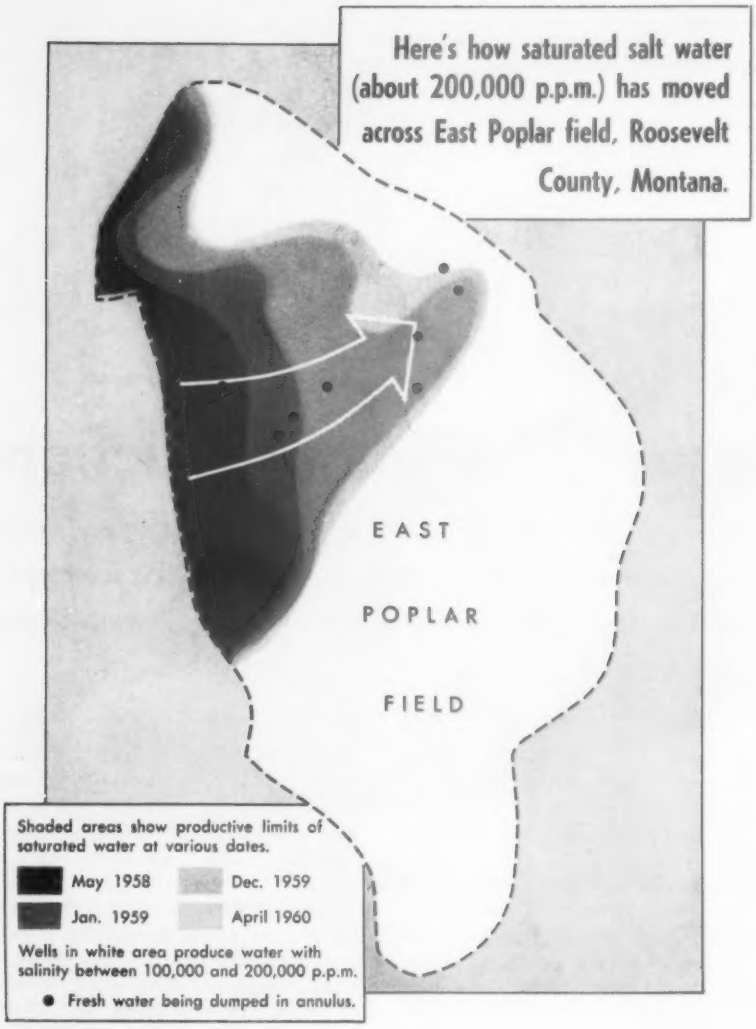
Migrating salinity. Water samples from wells throughout the field showed that the salinity was increasing to the east. Wells that produceed water of normal salinity originally were suddenly yielding water with salinities approaching the saturation point of 220,000 p.p.m. Cl^-. There was no mistaking the final outcome. Saturated water was slowly and steadily moving across the reservoir, and eventually all wells would be "problem wells." See map.

The solution. Dilution is the logical way to reduce the salinity of any solution. And this is what Murphy Corp. engineers have done. Fresh water is being pumped into wells where the salinity has reached the 200,000-p.p.m. point.

Also, pigs are run daily in the flow lines. Besides the salt, the pigs remove any accumulated paraffin. Paraffin is another one of the problems that Murphy has had to cope with at East Poplar. Most pumping wells are equipped with some 1,200-ft. of scraper sucker rods for paraffin removal in the tubing.

Since the winters in Montana are extremely cold, salt precipitation is more of a problem then than it is in summer. The solubility of the salt decreases as the temperature drops, and more salt is dropped out of solution to show up on the walls of the flow lines. To cope with low temperatures, all flow lines are buried 2½ to 5 ft. deep.

Fresh-water system. Fresh water for the dilution of produced salt water is taken from the Poplar River


Here's how saturated salt water (about 200,000 p.p.m.) has moved across East Poplar field, Roosevelt County, Montana.
EAST
POPLAR
FIELD
Shaded areas show productive limits of saturated water at various dates.
May 1958
Dec. 1959
Jan. 1959
April 1960
Wells in white area produce water with salinity between 100,000 and 200,000 p.p.m.
Fresh water being dumped in annulus.

that runs northeast-southwest through East Poplar field. An electrically driven duplex pump, capable of delivering 1,200 bbl. per day at 600 psi., has been installed on the bank of the river.

But that brings up another problem. There is local flooding in the area every spring when the ice breaks up. The pump and all associated equipment must be moved to avoid damage and possible loss.

Fresh-water lines are buried to a depth of 5 ft. to avoid freeezing.

When the produced water from any well reaches 200,000 - p.p.m. salinity, fresh water is dumped down the annulus. The fresh-water distribution system is in a constant state of expansion as new wells are added to the delivery schedule at regular intervals during the program.

Corrosion. Two types of corrosion are causing trouble at East Poplar. One of these attacks the casing where it goes through the salt zone above the Madison; the other works on the oil and water lines buried near the surface.

Where it exists, the salt zone overlying the Madison surrounds the casing of the East Poplar wells. This is a source of corrosion, and several salt-damaged wells have been repaired. Rectifiers have recently been installed on 60 wells in the field in an effort to arrest the corrosive action.

The salt is troublesome in other ways, too. At least three wells have suffered casing collapse due to the salt bed shifting. Net result is an expensive repair job.

Buried lines are subject to rapid external corrosion because of soil conditions in the area. All flow lines and fresh - water lines are doped, wrapped, and protected cathodically.

Secondary problems. Construction of a water-distribution system, dumping fresh water into oil wells, and other operations have introduced additional problems.

Freezing of water lines has already been mentioned, and that problem has been pretty well licked by burying the pipes below the frost line. But, the introduction of fresh water into the oil wells has caused some gyp formation. This is the result of mixing of incompatible waters. Mineral content of the river water is such that, in combination with produced water, a precipitate is formed, resulting in a tubing deposit not unlike gypsum deposits found in many other installations (OGJ, Aug. 8, 1960, p. 92). The problem is not severe, however, and adding a small amount of polyphosphate at the water source has kept the deposition reasonably in check.

Corrosion rate of well equipment has been stepped up since the injection program started. This is the natural result of the introduction of oxygen with the fresh-water stream. Fortunately, the corrosion rate is still within the safe zone, but coupon tests show that the rate is higher than it was before the fresh-water program was started. Engineers are watching this, and are studying the economics of various possible solutions.

High cost. Result of all of the remedies that Murphy has installed is obvious—high operating cost. According to Murphy's Denver division production and engineering personnel, increased costs are due to several things: (1) cost of installing and maintaining the fresh - water system, (2) cost of lifting fresh water dumped into oil wells, (3) chemical cost, and (4) down time for tubing and flow-line cleanout or thawout. This last one is a real expensive item since the field is normally operating at capacity, and any down time is a direct loss on the income side of the ledger sheet.

So you think you've got troubles?

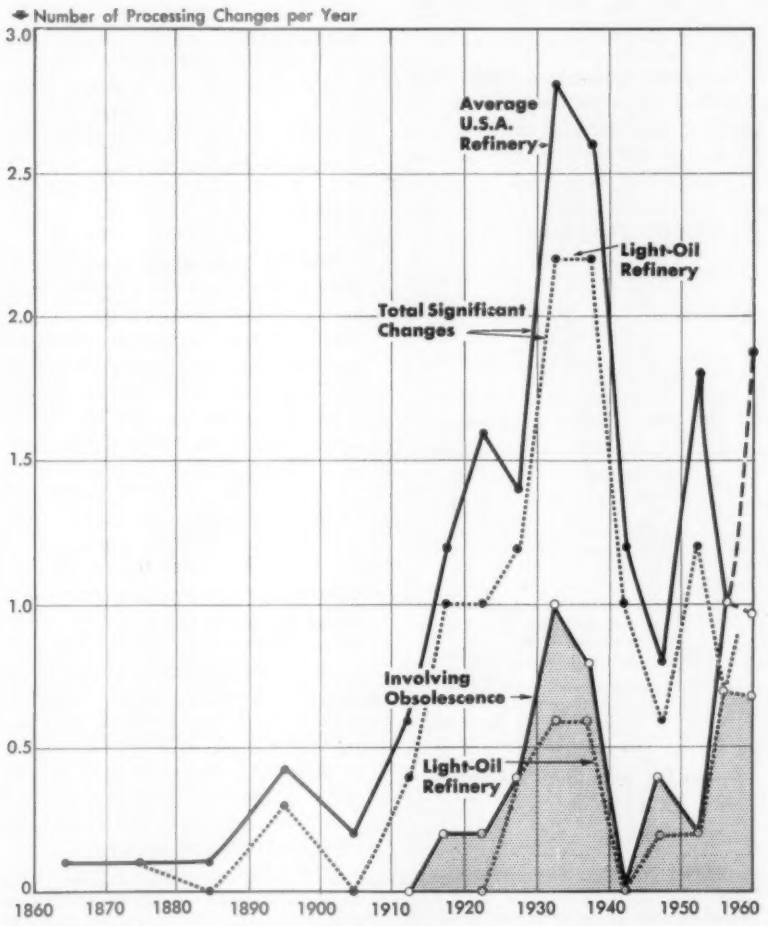
BY W. L. NELSON Technical Editor and Petroleum Consultant

Frequency of processing changes

TABLE 1—FREQUENCY OF CHANGES* ACCORDING TO TYPE OF PROCESSING

	Dist.‡	Treat.§	Gas	Lube	Chem.	Total	Total (ex. lube)
All changes	46.0	17.0	14.0	25.0	8.0	110.0	85.0
Number per year*	0.47	0.17	0.28	0.25	0.21	1.1	0.87
Years per change*	2.14	5.77	3.5	3.92	4.88	0.89	1.15
Significant changes	36.0	16.0	9.0	17.0	4.0	82.0	65.0
Number per year*	0.37	0.16	0.18	0.17	0.25	0.84	0.66
Years per change*	2.72	6.12	5.45	5.76	4.0	1.19	1.51
Obsolescence (causing) changes	8.0	2.0	2.0	7.0	...	19.0	12.0
Number per year*	0.25	0.07	0.08	0.15	...	0.4	0.33
Years per change*	4.0	15.0	12.5	6.85	...	2.5	3.0
Improvement (only) changes	27.0	14.0	7.0	10.0	4.0	63.0	53.0
Number per year*	0.27	0.14	0.14	0.10	0.25	0.63	0.53
Years per change*	3.63	7.0	7.0	9.8	4.0	1.58	1.88
Severe obsolescence	6.0	1.0	2.0	3.0	...	12.0	9.0
Years per change*	8.0	30.0	14.0	12.0	...	4.0	5.33
Avg. years obsolescence†	13.0	15.0	14.0	9.0	...	12.5	14.0

*Starting at year in which first change was initiated. †Based on 20-year depreciations. ‡Distillation, cracking and general processing. §Treating of light oils.



FREQUENCY of process changes. (Fuel-type or light-oil refineries shown with dashed lines.)

PROCESS COSTIMATING No. 76 of July 25, 1960, was a tabulation of processing changes that have taken place since the start of the oil industry. Of the 116 changes in processing that are listed, about 82 involve significant capital expenditures, only 19 clearly involve obsolescence of older equipment, and only 12 process changes have resulted in severe obsolescence (see Table 1 and Fig. 1).

Distillation, cracking, and general processing changes constitute the largest group (46 changes), and light-oil or fuel refineries have undergone a total of 77 changes.

The maximum rate of change occurred during the 1925-1940 period when two sets of cracking processes were replaced, shell-still batteries were replaced by pipe stills and fractionating towers, and the conventional methods of lube-oil treating and dewaxing were replaced by vacuum distillation and solvent processes. A lull occurred during the Second World War (although changeovers were frequent), and since the war innovations have increased again but have not as yet caused serious obsolescence. During 1957-1965, it is expected that the number of changes will return to 1 to 1.5 per year and a change involving obsolescence will appear at about 3-year intervals.

A large increase in asphalt-producing capacity is expected because of the large federal road program, but much of the capacity can be obtained at little cost by the remodeling of already existing vacuum flash equipment (in use for catalytic feed stock). In attaining a pool octane number of 100 (perhaps 1964) increased alkylation and catalytic reforming capacity will be needed; an increased utilization of tetraethyl lead; the isomerization of butane, pentane and light naphtha; and perhaps the use of solvent extraction to reject for recycling the low-octane components in catalytic reformate.

Efforts to feed asphaltic material directly to the reactors of catalytic plants will be continued. The bead-type processes have a natural advantage because much of the catalyst poison is ground from the surface of the beads by erosion and can be eliminated from the system. Truly catalytic processes for the cracking (and hydrogenation) of heavy oils (gas oil), may be the next major change.

The production or separation of increasing amounts of chemical base stocks will certainly occur, but such changes must be relatively small.

Do you have some excess cat reforming capacity?

Maybe aromatics production is your dish

- DX Sunray diverted excess capacity of a new catalytic reformer to aromatics production. Total investment, including Udex extraction unit, was $2,000,000. The calculated payout is under 2 years.

BY I. D. STEWART, R. A. LUSH, AND J. H. MILLER
DX Sunray

REFINERS are becoming increasingly aware of the possibilities of applying conventional oil - refinery processing methods to the production of petrochemicals. The following description of DX Sunray's aromatics operation at the Tulsa refinery can serve as a guide for other refiners that may be interested in upgrading their products for the chemical market.

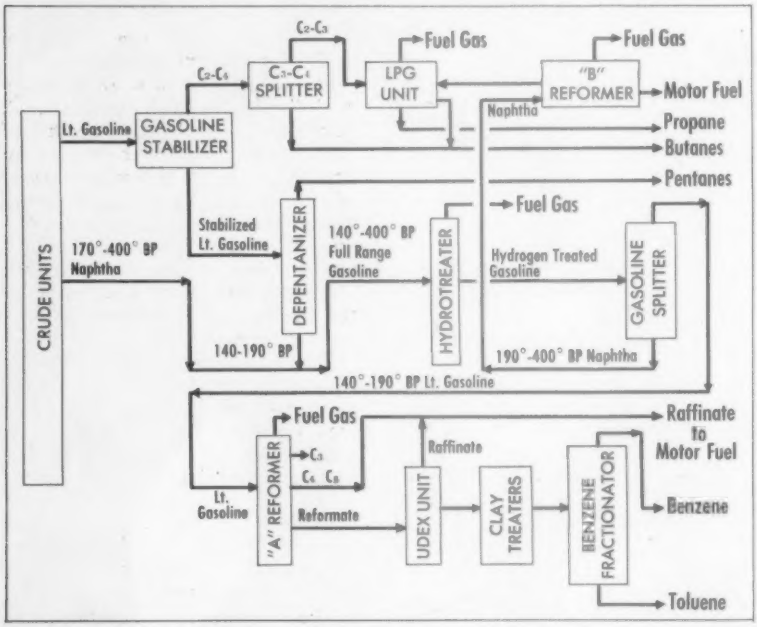
Tables 1, 2, and 3 represent some approximate figures for investment, operating cost, and profitability, respectively. Fig. 1 illustrates a refinery straightrun-gasoline section used as a basis for the sample evaluation. In brief, the desired boiling-range hydrocarbons are fractionated from the total straightrun, dehydrogenated to the aromatic, extracted, clay contacted, and separated by distillation.

Presented at ACS meeting, Duncan, Okla.

In Table 1, the investment is shown to be $2,000,000. In Table 2, the operating costs reflected, including catalytic reforming, are $3,300 per day. The calculated realization, as given in Table 3, is $3,388 per day, with a payout period of 1.62 years.

Catalytic reforming. The basic chemical reactions in catalytic reforming and solvent extraction of aromatics are both unique and interesting. The Universal Oil Products Co. Platforming process, announced in 1949, was the first commercial catalytic reforming method to successfully employ a platinum-containing catalyst to produce high-octane components from refinery low - octane naphthas. This same process can be used for a maximum production of light aromatics for separation.

Platforming is conducted at temperatures ranging from 850° to 1,000° F. and pressures of 200 to 600 psig. In general, the lower ranges of pressures are used for production of aromatics. For maximum aromatics production, the boiling range of the charge stock is varied in accordance with the product desired. For maximum benzene production only, the charge consists of a fraction boiling from 145° to 190° F. containing C_6 and benzene formers.



PLATFORMING is generally conducted at temperatures ranging from 850° to 1,000° F. and around 200 to 300 psig. for aromatics production. The charge stock is varied in accordance with the product desired. Fig. 1.

Solvent extraction. Recovery of pure aromatics from mixtures with nonaromatics is normally complicated by the occurrence of minimum-boiling azeotropes. Benzene, for instance, will form azeotropes with nonaromatics boiling within about 30° F. of itself, and toluene with those boiling within 15° F. This behavior prevents production of pure aromatics by simple fractionation. By utilizing differences in chemical type rather than in relative volatility, a simultaneous extraction of all aromatic types can be made to produce an extract of benzene, toluene and xylenes containing less than 0.2% nonaromatics. Postfractionation of the aromatic mixture to produce the individual aromatics is relatively easy, because of the wide differences in volatility between benzene and toluene and between toluene and xylenes.

The Udex process, originated by Dow Chemical Co. and developed commercially by Universal Oil Products Co., recovers benzene,

toluene, and xylenes from gasoline-hydrocarbon mixtures by using a diethylene glycol-water solvent. The feed stock can be as wide boiling as necessary to insure inclusion of all the desired aromatics. Where desired, bicyclic aromatics, such as naphthalene and the methyl naphthalenes, may be separated from single-ring aromatic structures.[2]

The extractive power of the Udex solvent for the various types of hydrocarbons roughly parallels their octane rating. Thus, the most readily extractable compounds are the aromatics, followed in order by the naphthenes, low-boiling paraffins, and high-boiling paraffins. In cracked naphthas, the hydrocarbon types are absorbed in the following order of preference: alkenyl-benzenes, benzenoid aromatics, cyclic dienes, open-chain dienes and cyclic olefins, open-chain olefins and cycloparaffins, and paraffins.[3]

The addition of water to the glycol improves ability of the solvent to "push out" the raffinate and still hold a maximum of aromatic extract.

TABLE 1—INVESTMENT COST

Udex extraction unit	$1,500,000
Offsite tankage, yard piping, loading, and miscellaneous	500,000
Total	$2,000,000

Process Details

A flow diagram of the Platforming and Udex units is shown in Fig. 2. Essentially, the production of high-purity, low-boiling aromatics from petroleum is carried out in three steps:

1. Prefractionation to concentrate the naphthenes in the feed.
2. Conversion of hydrocarbons to aromatics.
3. Separation and purification of the aromatics.

Prefractionation. Laboratory fractionation of a typical Mid-Continent full-range straightrun gasoline will demonstrate that the C_6 cut will have a boiling range of 145° to 185° F., the C_7 cut from 185° to 225° F., and the C_8 cut from 225° to 270° F. Since a few benzene-forming components exist in the front of the C_7 cut, and because of azeotropic mixtures existing, maximum benzene is obtained by charging a slightly overcut fraction. A minimum of paraffins other than normal hexane is desirable. Lighter paraffins do not react to any appreciable extent and serve no useful purpose in the feed. Heavier paraffins and naphthenes would tend to be converted to heavier aromatics.

Charge stock for the DX Sunray Platformer will, therefore, have a boiling range of 145° to 190° F. This will be fractionated from a hydrogen-treated, depentanized straightrun and coker gasoline stream. The two principal desirable components in this stream are cyclohexane, which will be dehydrogenated to benzene, and methyl cyclopentane, which will be isomerized to cyclohexane.

TABLE 2—OPERATING COSTS

Items—	Rate	Quantity	$/day
Operating labor	$3.50/hr.	2 men/shift	170
Utilities:			
Fuel gas	$0.20/MM. B.t.u.	187.5 M.M. B.t.u./hr.	900
Cooling water	$0.015/1,000 g.p.m.	12,000 g.p.m.	260
Steam, 150 psig.	$0.35/1,000 lb.	32,200 lb./hr.	270
Electricity	$0.01/kw.-hr.	833 kw.	200
Total utilities			1,630
Chemicals and catalyst			555
Laboratory			80
Maintenance			400
Rentals and royalty			380
Insurance and taxes			85
Total operating costs			3,300

TABLE 3—ECONOMICS

1. Value of products:

Product—	Liq. vol. %	B.P.C.D.	Posted prices, $/gal.	$/C. day
Fuel gas	4.37	175	0.0225	165
Propane	2.88	115	0.0400	193
Butanes	2.88	115	0.0500	242
Pentanes	2.00	80	0.0900	302
Raffinate	65.12	2,605	0.0900	9,847
Benzene	15.00	600	*0.3200	8,064
Toluene	7.75	310	*0.2300	2,995
Total value of products	100.00	4,000	0.1298	21,808

2. Manufacturing costs:

	$/gal.	$/C. day
Raw material	0.0900	15,120
Operating costs	0.0197	3,300
Total manufacturing costs	0.1097	18,420

3. Net realization before taxes and depreciation	$3,388
4. Investment	$2,000,000
5. Payout, before taxes and depreciation, years	1.62

*Quotation from Oil, Paint & Drug Reporter, May 1960, less $0.0200 per gallon freight allowance.

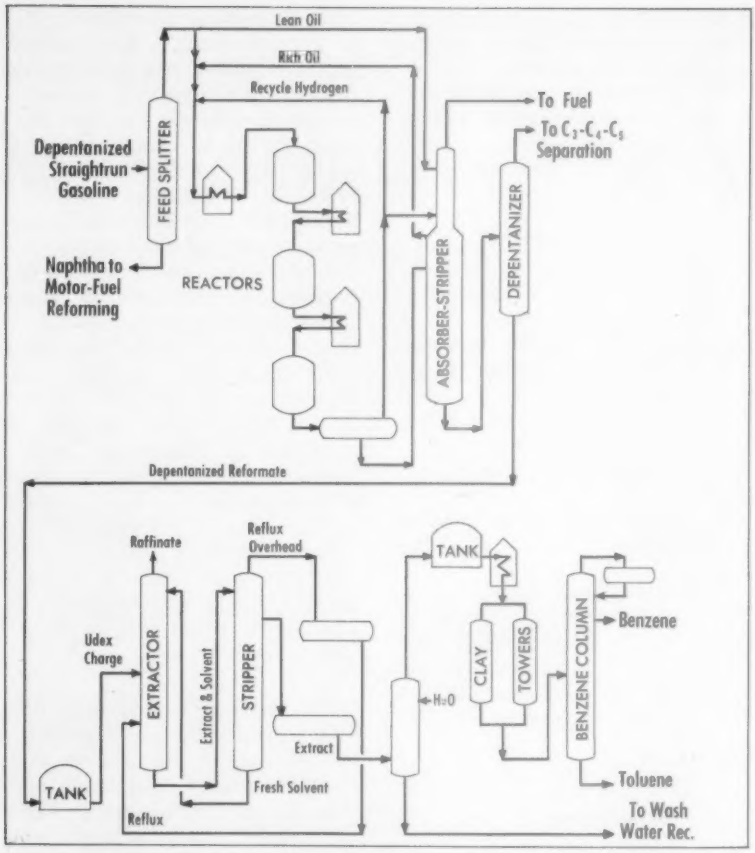
Conversion. The feed stock, along with recycle hydrogen, is preheated and charged to the first of three fixed-bed catalytic reforming reactors. Since the reaction is highly endothermic (requires heat), optimum conversion and temperature control is obtained by routing the flow, in series, through a total of three reactors with additional heat supplied between them.

There are six important process variables for controlling the catalytic reforming conversion:

1. For high theoretical benzene yield and for catalyst protection, the feed should be free from sulfur, nitrogen, chlorides, and metals. These components reduce catalyst activity and promote undesirable reactions.

2. Catalyst coking, with a resulting low benzene conversion and low liquid recovery, can result from contamination of feed and nonsteady operating conditions. When conversion becomes low, and an economic study has indicated that the catalyst should be renewed, this may be accomplished by replacement or by regeneration.

3. Reactor temperature is related to catalyst activity and operating pressure. The two primary reactions for benzene formation occur very rapidly at typical catalytic reforming temperatures. Cyclization of paraffins and hydrocracking reac-



THE UDEX UNIT uses a diethylene glycol-water solvent to recover benzene, toluene, and xylenes from a hydrocarbon mixture. The solvent's extractive power for various hydrocarbons roughly parallels their octane ratings. Fig. 2.

tions occurs more rapidly at higher temperatures. Hydrocracking results in coke deposition on the catalyst.

4. Low reactor pressure favors benzene production and retards hydrocracking. However, partial pressure of the hydrogen is lowered with a reduced static pressure and any hydrocracking has a greater tendency to produce coke on the catalyst. Also, it is usually more difficult to maintain the hydrogen recycle ratio at a lower pressure due to compressor limitations.

5. Space velocity, liquid-weight-hourly, is controlled by reactor charge rate. Excessive charge rates result in poor conversion and low charge rates can result in catalyst coking. Adjustments in charge rate must be accompanied by parallel changes in reactor temperature so as to maintain conversion without excessive hydrocracking.

6. Hydrogen - to - hydrocarbon mole ratio is controlled to minimize catalyst coking. Low ratios can be tolerated on light feed stocks with end points no higher than 190° F. Higher ratios, above the minimum required for control of coke formation, are of no appreciable value. In the normal operating range, the ratio has no significant effect on the actual reforming reactions.

The reactor effluent is cooled and separated into hydrogen recycle, net gas-make to absorption, and net liquid-make to stabilization. Propane, butane, and pentane, produced by cracking in the reactors, are recovered from the liquid and gas make by absorption and fractionation. The depentanized liquid product contains benzene, toluene, C_6 and C_7 paraffins, and unconverted methylcyclopentane and cyclohexane.

Component analysis of the feed stock and reactor effluent are given in Table 4. A charge rate of 4,000 bbl. per day yields 610 bbl. of benzene and 330 bbl. of toluene from the catalytic reforming. Thus, the aromatic production is 23.5% of the total charge, or 27.0% of the depentanized liquid production. A Gulf Coast gasoline, high in original aromatics and naphthenes, might produce as much as twice this yield.

Separation and purification of aromatics. Depentanized reformate is charged to the Udex unit, as illustrated in Fig. 2. Aromatics are recovered by a countercurrent, liquid-liquid extraction in a specially designed perforated plate tower. Solvent is charged near the top and feed near the center of the tower. The raffinate leaves the top of the extraction tower and is water-washed for glycol recovery.

The aromatic extract-solvent layer and a small quantity of paraffins leave the bottom of the tower for charging to a flash zone in the top of the stripper. Light hydrocarbons (mostly paraffin) and steam are flashed, condensed, and sent to the stripper receiver. The flashed liquid flows down into the top of the stripper where additional light hydrocarbons and steam are stripped by rectification and sent to the stripper receiver. Settled water is returned to the base of the stripper and the hydrocarbons are recycled to the bottom of the extractor.

The dissolved aromatics are vaporized and stripped from the solvent as it flows down the stripper tower. Aromatic vapors and steam are removed from the stripper and condensed into the extract receiver. Settled water is returned to the base of the stripper and the extract is water-washed for glycol recovery. The aromatics are clay-treated for removal of trace quantities of olefin, diolefin, and sulfur, so as to meet the acid-wash color specification for nitration - grade benzene. The aromatics are then fractionated for recovery of high-purity benzene and a toluene stream. Stripped solvent, free of aromatics, is withdrawn from the bottom of the stripper and returned to the top of the extraction tower.

Principal controlled process variables in the Udex operation:

1. The basic temperature control originates at the base of the stripper. The glycol must be completely stripped of hydrocarbons to prevent lowering of extraction efficiency and yet be held to a given water content. The extraction column and stripper are an isothermal operation with both extractor feed and solvent

TABLE 4—ANALYSIS OF PLATFORMER FEED AND REACTOR EFFLUENT

Components—	Feed		Reactor effluent	
	L.V. %	B.P.S.D.	L.V. %	B.P.S.D.
H_2	....	....	(1.7 wt. %)	....
CH_4	....	....	(0.1 wt. %)	....
C_2H_8	....	....	(0.6 wt. %)	....
C_4H_{10}	....	....	2.9	120
C_5H_{12}	....	....	2.0	80
C_6 paraffins	48.1	1,925	43.3	1,725
C_7 paraffins	16.0	640	13.6	545
C_8 paraffins	....	....	....	....
Methyl cyclopentane	14.3	570	5.7	230
Cyclohexane	9.1	365	0.9	35
C_7 naphthenes	10.4	415	1.0	40
C_8 naphthenes	....	....	....	....
Benzene	1.7	70	15.2	610
Toluene	0.4	15	8.2	330
Xylenes + EB	....	....	....	....
Total	100.0	4,000	92.8	3,715

from stripper entering at the same temperature. A direct - fired, temperature-controlled, reboiler-heater is used. This reboiler heat constitutes the major utility cost in the Udex system.

2. Water content from the stripper bottoms is held at a selected concentration in the diethylene glycol. If water content becomes low, the solvent selectivity decreases and too much paraffin reflux builds up. If water content is too high, the solvent solubility decreases, causing loss of aromatics and loss of paraffinic reflux.

3. Extractor pressure is maintained sufficiently high to prevent vaporization and a resulting loss in extraction efficiency. The top preflash section is held at a selected pressure to avoid overflashing and inclusion of excess aromatics in the reflux stream. Pressure control on the stripper is necessary to help maintain the desired water content in the bottom recycle solvent.

4. Lean solvent circulation rate must be maintained to obtain the desired recovery of aromatics. A unit is primarily sized to handle a designed solvent circulation rate. If feed rate is reduced, percentage recovery is increased, particularly in the heavier aromatics. If feed rate is increased above design throughput, production of aromatics can be increased but at a lower volume percentage recovery. Purity, however, other conditions being equal, will remain unchanged over a relatively large range of solvent-to-feed ratios.

5. The purpose of reflux to the bottom of the extractor is to displace heavy paraffins from the rich solvent so that the dissolved aromatics will be of high purity.

6. The benzene fractionator has a pressure - compensated, temperature - controlled reflux system for high - purity overhead while maintaining a benzene - free bottom stream. Pressure - variation effects, caused by barometric changes, column-load fluctuations, or friction-drop changes, are compensated for by using as a reference point the boiling temperature of the pure aromatic top product at the column working pressure. The product control valve closes off as necessary when the tower temperature at this point rises above the reference point. This control system allows the production of benzene having a 0.6° to 0.8° C. distillation range. Freeze point is a sensitive measure of impurities, pure benzene being 5.533° C.

Table 5 indicates Udex performance and recovered quantities. Benzene recovery is 98.5% and toluene recovery is 94.0%. Table 6 reflects tests on the three effluent products.

TABLE 5—UDEX PERFORMANCE

	L.V. %	B.P.S.D.
Charge:		
Paraffins (C_6-C_7)	64.6	2,270
Methyl cyclopentane	6.6	230
Cyclohexane	1.0	35
Naphthenes (C_7)	1.1	40
Benzene	17.3	610
Toluene	9.4	330
Total	100.0	3,515
Products:		
Benzene	17.1	600
Toluene	8.8	310
Raffinate	74.1	2,605
Total	100.0	3,515

Acknowledgments

The writers acknowledge the assistance of Harry Brown, vice president of manufacturing for DX Sunray; Universal Oil Products Co., and of other employes of DX Sunray Oil Co., who have contributed either directly or indirectly to the preparation of this paper.

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TABLE 6—ANALYSIS OF UDEX PRODUCTS

Benzene:	
Specific gravity	0.8840
Distillation range, D-850-50 e.p.-i.b.p., °C.	0.7
Melting point, °C.	5.4
ASTM color	Water white
Acid wash color:	
Acid layer	0
Hydrocarbon layer	0
Bromine index	1
Toluene content	Nil
Sulfur	Nil
Thiophene	Nil
Toluene:	
Specific gravity	0.8730
Distillation, D86-56, °F.:	
I.b.p.	225
10	227
40	228
50	228
90	235
E.p.	400
Residue	1.7
Loss	0.3
Color, Saybolt	–15
Aromatics, vol. %	99.2
Raffinate:	
Specific gravity	0.6850
Distillation, D86-56, °F.	160-190
Reid vapor pressure	5.5
Res. Oct. No.:	
Clear	65
With 3 cc. TEL	85

This offshore rig can go for several days without its tender

. . . thereby cutting drilling costs during foul weather when the tender must pull away from the platform

BY CARL HOOT
Journal Staff

FUEL FOR PLATFORM ENGINES and water for engine radiators and draw-works brake are stored in tanks in substructure at left. Unitized construction of the new rig is evident as it is rigged up at Morgan City.

EXPENSIVE RIG TIME is being saved by Gulf Oil Corp. in its offshore operations by changing over from the usual tender-type rigs to what the company calls "semiself-contained units."

The new rigs can operate for several days independent of the platform tender. Thus, the rig can continue drilling even if the tender must pull away from the platform because of foul weather. The rig can be placed on the platform and spud a well before the tender arrives. Or, it can continue completion work after the tender leaves. The new unit can also be used as a workover unit without an accompanying tender.

Versatility of the new rigs keeps them working when many others are shut down. Result is faster, cheaper wells for Gulf.

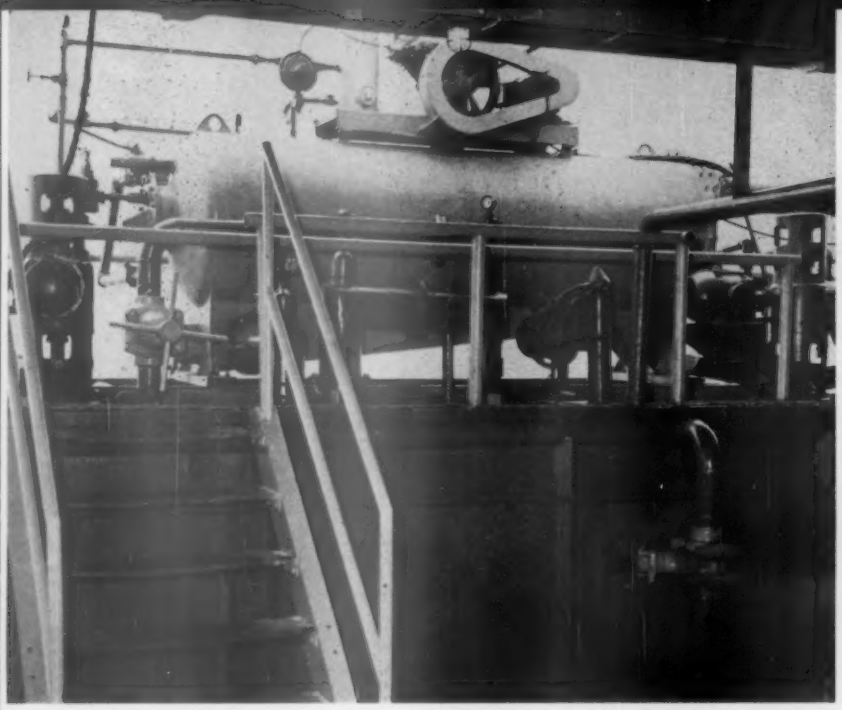
Basic formula for constructing the new platform rigs is to take a standard unit, add horsepower, put on a mud pump "big enough to do the job," and fill in the necessary facilities to keep rig crews safe and comfortable.

Pictured here is Kermac's Rig 48, modified to fit Gulf's plans by Kerr-McGee Oil Industries Gulf Coast division yard at Morgan City, La. Rig 48 is now drilling for Gulf in offshore Louisiana waters. It is the fourth of the semiself-contained units that has been rigged up for Gulf.

EMERGENCY LIVING QUARTERS for drilling crew has heliport on roof. All-electric galley, showers, beds, and air conditioning keep men comfortable and safe during an offshore storm. Older tender rigs have all crew facilities on tender.

Rough-weather problems. The platform-and-tender combination has many advantages for offshore drilling. It also has its problems, many of which are associated with rough weather. Quite often, the tenders must pull away from the platform when wave action gets too high. Occasionally, the tenders even break away from their moorings at the platforms. In either case, everything stops but the day rate on the rig and other contract equipment.

Fall brings the roughest weather to offshore operations. The time lost in sitting out a winter storm may not in itself be excessive. Still, footage cost of the wells may be boosted outrageously if it is necessary several times each winter to shut the hole in, prepare for the worst that might come, and then, afterwards, get drilling under way again. These operations alone can add 2 to 4 or



FULL MUD SYSTEM, including degasser, agitators, and steel mud tanks shown here, go onto platform with rig. There is also a moderate amount of storage space for weight material so that the mud can be maintained in good condition for several days without supply from tender or shore.

more days to the time lost because of the storm.

Normally, a tender-type rig depends on the tender for high-pressure mud pumps and, in some types, electrical power. Engines on the platform are mainly used in hoisting, while pump capacity on the platform is only enough to fill the hole. The tender also provides all of the living facilities for crew members and a heliport for transportation.

Where to start over. There were many "first" considerations when it came to redesigning a tender-type rig that could carry on with most drilling operations, independent of its tender. Safety for crew members called for a heliport on the platform, in addition to one on the tender. Next in importance was crew comfort. Gulf added air-conditioned living quarters to care for as many as 10 men.

Then a 1,000-hp. engine was added to the 1,000-hp. engine-generator set already on the unit.

A mud system, consisting of tanks, mixers, shale shalers, and a large mud pump; and a generating plant for lights, shale shakers, mud mixers, radio, refrigeration, air-conditioning, heaters, and auxiliary power, were then added.

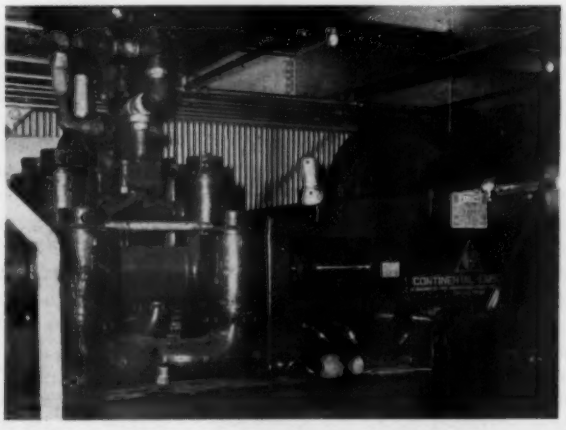
The 100-bbl. fuel tanks were installed up on the rig; these hold enough fuel to run the engines about 5 days. Enough fresh-water storage was added to cool the draw-works brakes, fill engine radiators, and clean up the rig. Smaller tanks in the power section carry potable water for the crew. There also is space in that section for mud material. A deep-well pump supplies ocean water for the mud. All modifications are unitized into the rig substructure.

Gulf engineers are enthusiastic about their revised tender-type rigs. In addition to being able to drill and operate without the tender during storms, the rigs also can make completions after the tender is released. They point out the possibility of doing workover jobs with the rig alone, and of spudding in and drilling before the tender arrives, should the tender be busy elsewhere.

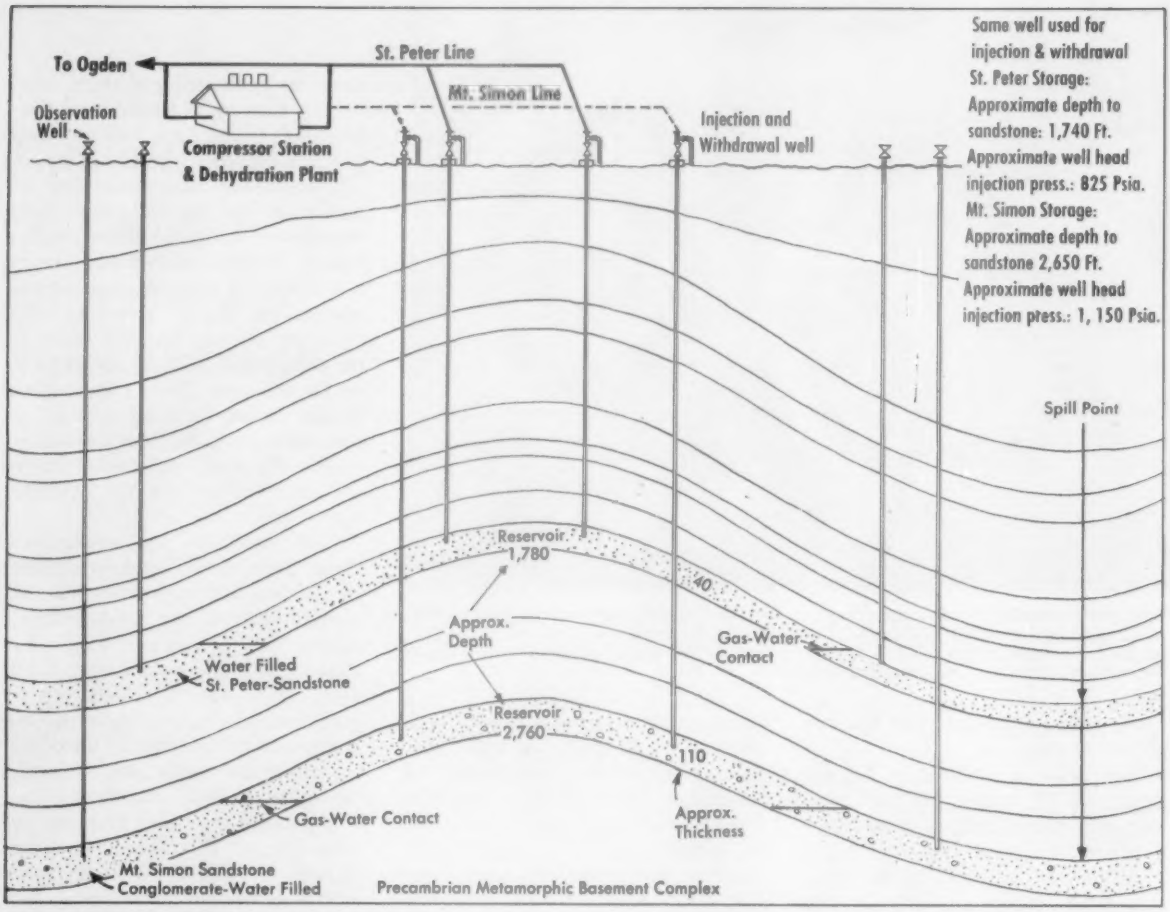
They also are quick to point out what it can't do. There is room enough on the rig floor to stack drill pipe, but not much casing. Nor can drilling continue for long periods when very much weight material is required.

These modified platforms show a minimum of down time due to weather—enough saving, Gulf says, to pay for all of the engineering and extra equipment costs.

NEEDED POWER for drilling independent of the tender comes from this 1,000-hp. diesel-electric-generating set. This unit sits on the well platform; another sits in the drilling tender and both are used for routine drilling.



HYDRAULIC PUNCH that is key to acceptable drilling speed is provided by this 1,000-hp. mud pump. It is driven by an electric motor and goes on the platform with the drilling rig.



CROSS-SECTIONAL SKETCH of Northern Natural's aquifer storage area near Redfield, Iowa, shows the development of St. Peter and Mount Simon, the two water-filled sandstone formations.

How Northern Natural operates

FIRST deep drilling for underground gas storage in water-filled sandstone was undertaken by Northern Natural Gas Co. in 1954. Practically all prior underground storage had been limited to depleted oil or gas fields.

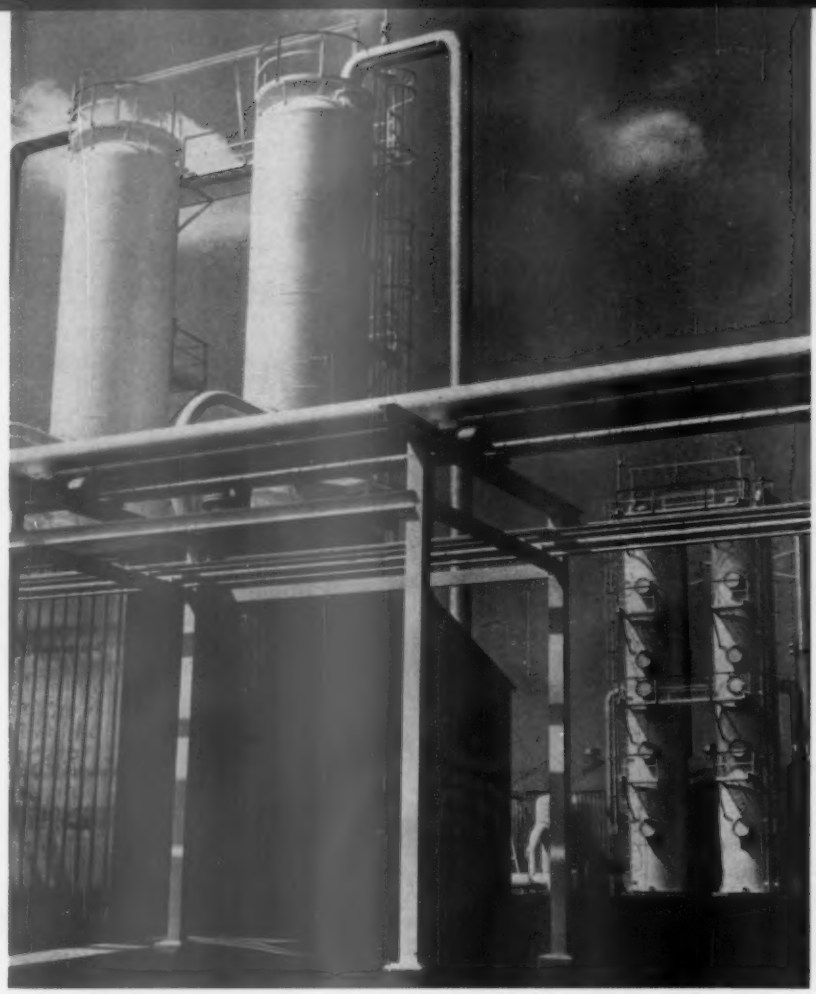
Although Northern Natural's storage area near Redfield, Iowa, has not yet reached capacity, the last few years have brought general acceptance to the theory of aquifer gas reservoirs. These reservoirs enable pipeline customers to obtain in midwinter a supply of gas that has been brought from the Southwest and forced underground during summer months. Across the nation, aquifer storage has permitted broadening of the gas market at significantly lower cost than would have been possible otherwise.

Depending on location, engineering, and geological factors, there can be wide variations in cost comparisons of pipelines and underground reservoirs. Northern Natural's Redfield reservoir cost was only a fraction of what main-line facilities to do the same job would have been.

Actually, Northern Natural is now taking 100 M.M.c.f.d. from the Redfield reservoirs and expects within 3 years to increase the withdrawal rate to about 300 M.M.c.f.d. Whether for delivery or testing, withdrawal rates as well as the amount of gas stored must be approved by the Federal Power Commission.

Storage reservoirs. Northern Natural's reservoirs near Redfield have been developed in two sandstone formations known as the St. Peter and the Mount Simon. The St. Peter, 1,736 ft. below ground level at its crest in the Redfield area, is 37 ft. thick and was developed first. The Mount Simon, which crests at 2,647 ft. below ground level, has an average thickness of 115 ft.

Gas forced into the sandstone displaces water. In the St. Peter reservoir, gas is stored at pressure of 110 to 150 psi. over the reser-



NORTHERN NATURAL'S DEHYDRATION PROCESS calls for the gas to pass through four beds of bauxite desiccant. The desiccant is regenerated at intervals by gas heated with a vaporized heat-transfer medium.

aquifer gas storage

voir's original hydrostatic pressure of about 700 psi. Since the gas is delivered from the Southwest at 800 psi. the necessary pressure is provided by the main pipeline.

For the Mount Simon reservoir, however, gas must pass through a compressor. It is stored at approximately 1,250 to 1,300 psi. or 200 psi. over the original formation pressure.

Water content. Pressure and temperature determine the amount of moisture that gas will hold before it is completely saturated. At 70° F. and 800 psi., the limit is about 28 lb. of moisture per million cubic feet of gas.

For delivery to Northern Natural customers, the gas must be dried to a maximum of 5.8 lb. This is because of lower pressures and lower temperatures that will be encountered before the gas reaches the consumer.

Winter temperatures in Northern Natural's territory frequently drop below zero, and the pipeline pressure may fall to as low as 50 psi. in small towns. Dehydration is necessary to prevent corrosion and freezing of condensate inside the pipeline.

Dehydrators. The Northern Natural dehydrating facilities at Redfield might well be described as a model operation. Equipment already is in place for tripling gas withdrawal to approximately 300 M.M.c.f.d.

Two adsorber vessels are connected with the St. Peter withdrawal line and two with the Mount Simon line. Each vessel contains 37 tons of bauxite desiccant. The interior of each vessel is checked once a year, and desiccant samples are removed for analysis. Thus far, the contamination has not been sufficient to predict the desiccant's service life.

Approximately 300 M.M.c.f. of gas passes through each adsorber before regeneration is necessary. When the moisture content of the departing gas reaches 5.5 lb. per M.M.c.f., that vessel automatically switches off and the gas is diverted to the alternate vessel.

Regeneration of the wet desiccant takes about 8 hours. This process starts in a gas-heated vaporizer. Dowtherm A heat-transfer medium is vaporized to heat the gas used for regeneration of the desiccant.

The two vaporizers installed in 1956 for use on the St. Peter line are rated at capacity of 3,000,000 B.t.u. per hour, and the two installed in 1958 for the Mount Simon line are rated at 4,500,000. One storage tank for the heat-transfer agent serves each pair of vaporizers. The capacity of each vaporizer is 7,500 lb.

Peak efficiency in Northern Natural's regeneration system is gained at 500° F. At this temperature, Dowtherm A vapor creates pressure of only 15.7 psi. Steam would create pressure of 680.8 psi. at the same temperature.

The heated gas flows to the adsorber vessel and passes through the four beds of desiccant in the reverse direction of adsorption flow. The temperature desired in the adsorber is 250° F., but gradient is difficult to avoid. However, by sending the gas in reverse direction the gradient falls toward the adsorption inlet end.

In the adsorber vessel, the hot gas vaporizes the moisture and removes it. The wet gas flows to a cooling tower, where its temperature is reduced to 80° F., and the condensate falls into a big vessel. Hydrocarbons are burned off prior to disposal of the water. The gas returns to the regular pattern of withdrawal flow.

Get the total cost of your accidents

Beginning: A series which points out ways to reestablish the downward trend in the injury, fire, and vehicle-accident frequencies and severity in the petroleum industry

BY JAMES H. HERBERT
Consultant, Accident and Fire Prevention, Greenwich, Conn.

INJURIES, fires, and personal and property-damage claims can add up to 10 to 20 cents per share of outstanding stock each year in an oil company, if the total cost of such economic waste is determined.

The old adages, "Don't worry; we are self-insured," or, "Never mind, the insurance company will pay for it," are costing the oil companies millions of dollars each year.

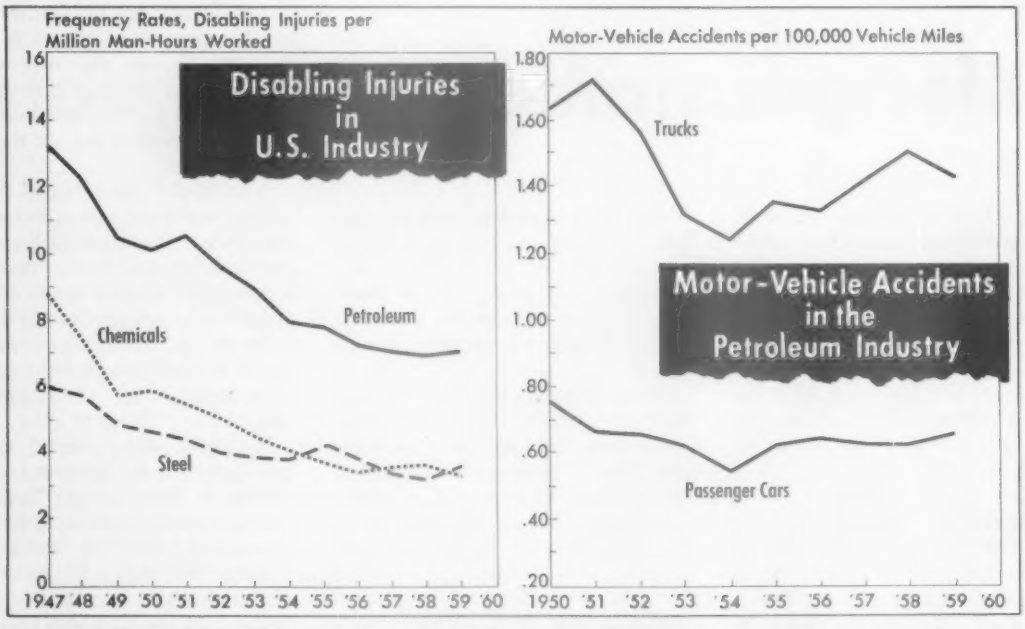
An outstanding job has been done by petroleum companies in reducing injuries, fire, and vehicle-accident frequencies, but the accompanying curves show that these reductions have stopped and that frequencies are leveling off.

Apparently progress has stopped. A barrier seems to exist, but it can be broken. I believe a rejuvenation in safety in the petroleum industry is necessary.

There is no argument about the humanities of safety, so this series of articles is being directed to the **economic** value of a sound accident and fire-protection program.

First step. The first step is to get **total accident costs.** Since this is so rarely done, they may be quite startling. Here's an example from the National Safety Council:

"A beverage concern reported numerous cuts from broken bottles, but the compensation and medical costs were not considered serious by the employer. Investigation disclosed that the total loss because of bottle breakage was more than **30 times** the injury costs. Correction of the accident causes, therefore, led not only to reduction of injuries but also to operating savings far



FREQUENCY RATES for disabling injuries in the petroleum industry have been sharply reduced since 1947, but trend is leveling off, and record is still poor compared to other industries. Incidence of motor-vehicle accidents is high.

greater than the injuries would have indicated."

Here are some of the items to review in determining total cost of injuries, fire, and personal and property damage claims.

Number, type, cost, and location where occurring, of:

1. Disabling injuries.
2. Minor injuries.
3. Absenteeism due to accidents off the job.
4. Fires and explosions.
5. Vehicular traffic accidents.
6. Bodily injury claims paid to the public.
7. Property damage claims paid to the public.
8. Plant, equipment, tool, or product damage or loss cases not involving fire or employe injuries, i.e. near misses resulting from carelessness.

In determining cost factors in connection with employe **injuries** consider:

1. Premium rates of pay for employes who replace injured employes due to unscheduled work hours.
2. Upon the injured employe's return to work, if he is placed on light work, what is the difference between the pay which he receives and the rate of the pay of the light work to which he is assigned?
3. Time taken by company representatives in appearing before workmen's compensation board hearings in connection with employe injury cases.
4. Continued medical treatment of an employe after his return to work.
5. Benefits under company benefit plan, if payable in addition to workmen's compensation benefits.
6. Workmen's compensation.
7. Medical and nurse expense and laboratory fees.
8. Hospital and surgical expenses.
9. Replacement costs for employe's clothes, glasses, and other personal effects.
10. Time taken by supervisors and others taking injured employes to doctor, hospital, and home.
11. Time taken by supervisors and others investigating cause of accident.

In determining cost factors in connection with **fires,** consider:

1. Replacement cost of damaged equipment as opposed the amount of insurance carried or book value.
2. Down time of equipment.
3. Down time of equipment not damaged but which can operate only in connection with damaged equipment.
4. Overtime paid to get out orders delayed by fire.
5. Loss of time of employes idled by fire but paid.
6. Damage to raw and finished products.
7. Installation cost of replacement equipment.
8. Labor for cleaning up fire location and for removing damaged equipment.
9. Fire-fighting agents such as foam.
10. Damage to company fire-fighting equipment.
11. Damage to fire-fighting equipment of others.
12. Fees paid to outside fire-fighting companies.
13. Claims paid as a result of damage to property of others.
14. Claims paid to others than employes as a result of personal injuries.
15. Rental of equipment while waiting for replacements.

In determining the costs of accidents and fires, consider these factors, even though they are not practically additive. Regardless, they could be the most expensive items.

1. Inconvenience to customers.
2. Loss of customers.
3. Bad employe relations.
4. Bad public relations.
5. Unduly strict community ordinances resulting from employe injuries or public injuries or property damage.
6. Inefficiency of employes who replace injured employes due to lack of familiarity with job duties.
7. Loss of irreplaceable records.

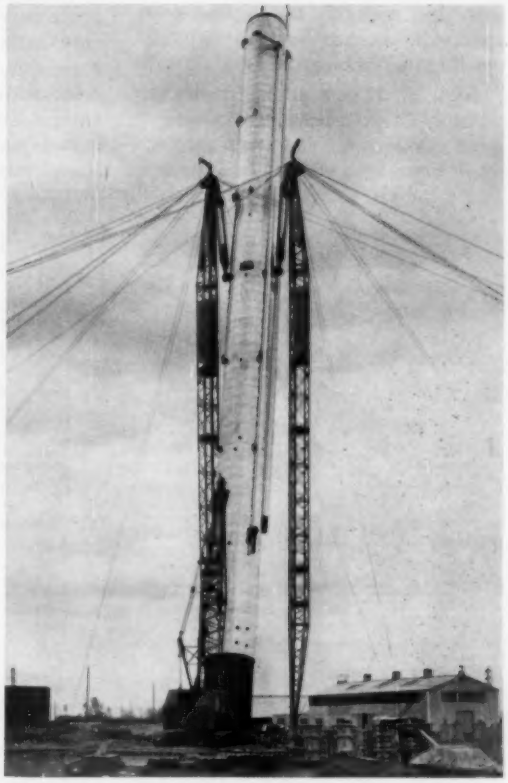
Insurance benefits do not, nor can they ever pay for the total costs of injuries, fires, explosions, or personal and property damage claims. A company may be compensated for a damaged plant and damage to equipment, also for damage to raw and finished products, but, inventories are kept at a minimum and profits are generally based upon uninterrupted flow of products to the customer.

It is the down time of processing and delivery equipment which can make the difference between profit and loss in the competitive state in which the oil industry lives.

TALLEST TOWER

. . . ever erected in one piece, and the longest shipped by rail, was installed at Sinclair-Koppers Chemical Co.'s new styrene plant in Houston by Badger Manufacturing Co. The tower, one of eight to be erected on a common foundation slab, is over 227 ft. tall and weighs more than 300 tons with insulation.

Completion of the 70 - million - pound per year plant is scheduled for midyear (OGJ, Feb. 15, '60, p. 72).



How two major companies go about

Estimating investment costs

• Texaco cost experts outline some data on estimating offsite investment costs and Gulf presents a method for estimating the battery-limits investment required for a new plant.

WHEN YOU are estimating plant-investment costs, you want reliable results and you want them in a hurry. And, as competition becomes keener, this phase of an engineer's activity assumes more and more importance.

To get reliable results, of course, you must have good data, and a good method for putting these data to work.

Two companies outlined their data and methods for getting cost estimates recently at an AIChE meeting in Washington, D. C.

Joel H. Hirsch and Edwin M. Glazier, Gulf Research & Development Co., explained the use of some equations which were developed by Gulf researchers for estimating total battery-limits investment. Based on data from 42 refining, petrochemical, and synthetic-fuels plants, these equations were derived by statistical analysis of the data.

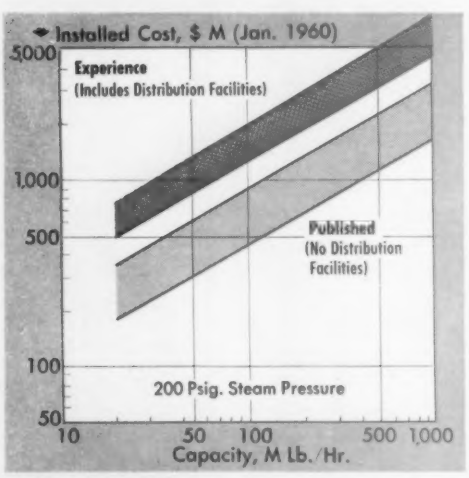
S. P. Dickens and F. R. Douglas, of Texaco Research Center, outlined data for estimating offsite investment costs. Often offsite costs are overlooked, the speakers said, because they are assumed to amount to very little. However, offsite costs can exceed the battery-limits investment and they must be considered along with an estimate of the working-capital requirement for any completely descriptive analysis.

1. Offsite Investment Costs

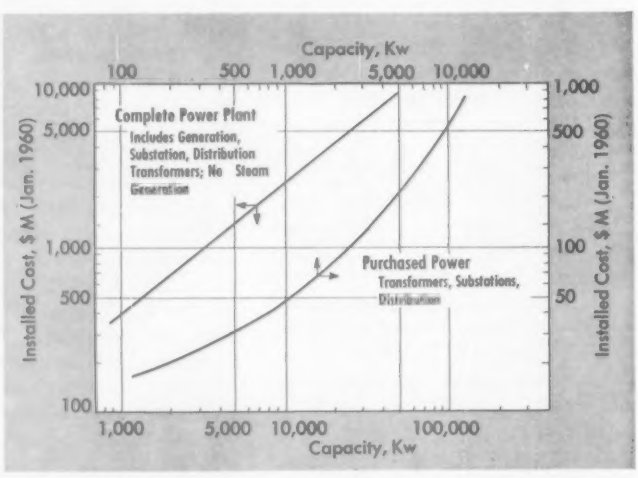
What are offsite costs going to be in relation to battery-limits investment?

Data cited in the literature range from about 5% to almost 200%. Texaco's cost experts said that the answer depends primarily upon whether the plant being considered is new or whether it is a moderate or a major addition to an existing unit.

If the addition to the plant is going to require few offsite facilities, the cost will be around 15% of the battery-limits investment. More often the cost is about 30%. And if the plant under consideration is new, offsite costs cut run to 120%.



COST OF GENERATING steam with an oil or gas-fired boiler. Cost includes boiler, instruments, buildings, water treating, stack, fans, and piping. Coal-fired boilers can cost up to 20% more. Fig. 1.



POWER GENERATION and distribution costs. If power is to be bought, then only transformers, substations, and distribution facilities need to be provided. These costs are shown in the lower curve of the diagram, Fig. 2.

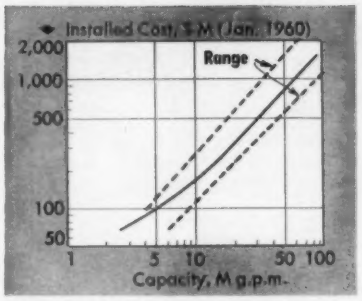
Following are some of the things which must be considered in any cost analysis of offsite facilities.

Steam. Cost of steam-generating equipment is shown in Fig. 1. Texaco's men pointed out that there was a wide variation in cost data for this type of equipment and that the data published in the literature were considerably lower than actual cost. However, they pointed out that this difference might be because normally distribution costs are not included in the published data, whereas in an actual plant these costs are very often included. The width of the bands in Fig. 1 show the range of available data. Published data were corrected to a constant 200-psig. steam pressure; correction factors for other pressures may be obtained from the following equation:

$$\text{Relative-cost factor} = 0.000577\ (\text{steam pressure}) + 0.885$$

Power generation. Fig. 2 shows costs for power generation and distribution. When a unit is being added to an existing refinery, Texaco said, costs of power distribution will range normally between $45 and $55 per kilowatt, whereas the cost of a complete grass-roots refinery may be as high as $60 per kilowatt.

Cooling towers. Costs range from about $10 to $30 per g.p.m. with an average of about $17. Texaco said that there was little relation between size and cost. More significant, the company's experts said, were wet-bulb temperature, the approach to wet-bulb temperature upon cooling, and the cooling range. Costs are shown in Fig. 3.



COOLING-TOWER cost includes basin, foundation, pumps, motors, water treating, electrical facilities, and instrumentation. Distribution facilities (pipelines, supports, etc.) are about 32% of the base curves. Fig. 3.

Water treating and distribution. These costs are shown in Fig. 4, excluding cooling towers. These include the cost of river or well-intake, filtering, water-treating, and distribution facilities.

Storage. Over 90% of storage cost is due to tanks, including distribution, Texaco said. The remainder is for warehouses and storehouses.

Fig. 5 shows the cost of storage tanks, less foundations. Cone-roof tanks in the 100,000-bbl. class cost about $1.10 per barrel, while floating-roof tanks of comparable size cost about $1.60 per barrel. The cost of salt-dome storage is about $2.50 per barrel, while that figure quickly runs up to $8.00 per barrel when mined underground storage is used.

Published data on spheres show that the cost ranges from about $10 per barrel for 15-psig. storage up to about $25 per barrel for 100-psig. storage. However, experience has shown that the actual cost is about 20% less than the published cost. In view of the large difference in cost between spheres and either salt-dome cavities or mined underground caverns, it was explained that spherical storage could only be considered where the volume of storage required is small or where underground storage is not feasible.

Foundation costs vary considerably, not only from one area of the country to another but also within the confines of a plant, it was noted. The following approximate costs may be added to the tank cost presented in Fig. 5.

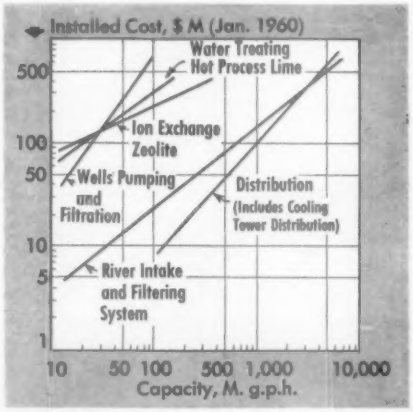
Foundations:	
Earth bearing, sq. ft.	$0.35
Pile bearing:	
Concrete piles and slabs, sq. ft.	$8.40
Wood piles and slabs, sq. ft.	$5.40
Levees:	
Fill dirt, cu. yd.	$1.00
Handling and forming, cu. yd.	$0.55

Buildings. Costs for various buildings are shown in Table 1. Costs of buildings vary widely and the figures shown here are those approximating the mean of all data reviewed, the Texaco men explained. It would not be unusual, they said, to find costs varying as much as 40% from those shown here.

Other things you may be called upon to consider, Texaco's cost experts said, are the costs of land, docks and wharfs, fire protection, fences, roadways, railway tracks, railway tank cars, loading racks, tankers and barges, sewage disposal, pipelines, compressor stations, and mobile equipment.

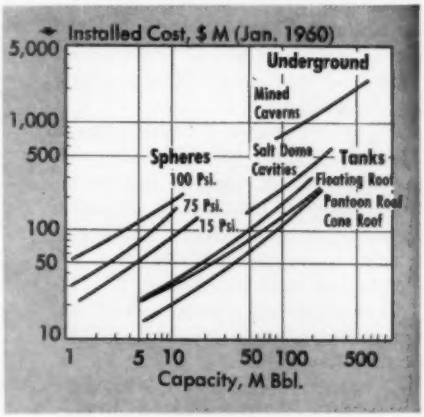
2. Battery-Limits Costs

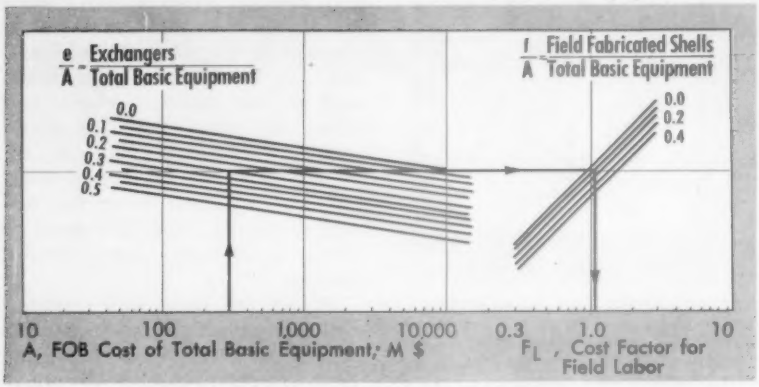
Presenting a detailed analysis of how they go about estimating bat-



WATER TREATING and distribution costs. To get total for complete plant, add together the cost for a cooling tower (Fig. 3), river or well intake and filtering, water treating, and distribution. Fig. 4.

INSTALLED storage cost less foundations. Foundation for a 100,000-bbl. storage tank costs about $6,000. Fig. 5.





FIELD-LABOR cost factor. ENR index = 700. Fig. 6.

tery-limits investment, the Gulf men explained that the total cost is calculated from the following equation: The procedure was developed for estimating new units only and is not recommended for revisions to existing units.

$$I = E[A(1+F_L+F_P+F_M)+B+C]$$

Where:

I = total battery-limits investment, dollars.

E = indirect cost factor representing contractors overhead and profit, engineering, supervision, and contingencies. E is usually assigned a value of 1.4.

A = total FOB cost of all battery-limits equipment. This cost does not include any incremental cost for alloy materials when they are exclusively used for corrosion resistance.

F_L = field labor cost factor (Fig. 6). Excluding both supervision and labor charges which have been included in the B term, $F_L \times A$ is the total cost for field labor.

F_P = piping material cost factor (Fig. 7). Total cost of piping materials ($F_P \times A$) includes pipe, fittings, valves, hangers, and supports but excludes charges for installation labor and insulation. These charges are included in F_L.

F_M = cost factor for miscellaneous items (Fig. 8). Miscellaneous costs, $F_M \times A$, include insulation materials cost, instruments, foundations, structural steel, buildings, wiring, painting, and the cost of freight and field supervision.

B = estimated erected cost of all equipment, such as furnaces, tanks, cooling towers, etc.

C = incremental cost of alloy materials provided these materials are used only for their corrosion resisting properties. Thus, for an alloy pump used for corrosive service, the cost of a carbon steel pump of identical design would be included in the total basic equipment cost A; the incremental alloy cost (cost of the alloy pump minus cost of the carbon steel pump) would be included in C.

F_L, F_M, and F_P, the three installation factors, are defined by the following equations:

$$\log F_L = 0.635 - 0.154 \log A_o - 0.992\ (e/A) + 0.506\ (f/A)$$

$$\log F_P = 0.266 - 0.014 \log A_o - 0.156\ (e/A) + 0.556\ (p/A)$$

$$F_M = 0.344 + 0.033 \log A_o + 1.194\ (t/A)$$

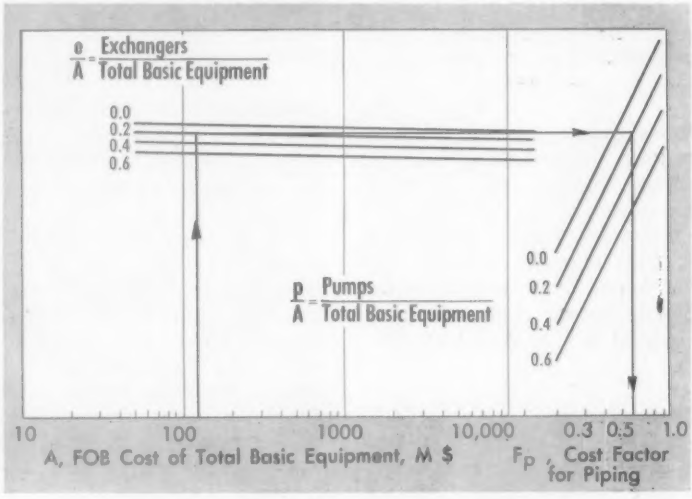
Where:

A = total cost of basic equipment.

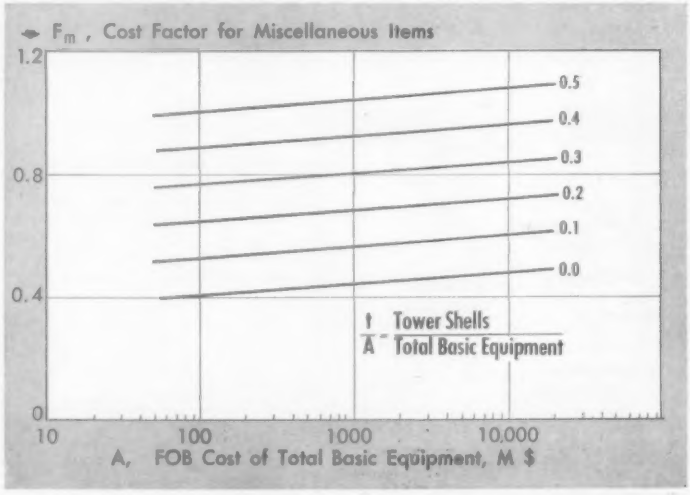
A_o = A, expressed in M$.

p = total pump plus driver cost (less incremental cost of alloy).

e = total heat exchanger cost



PIPING cost factor. ENR index = 700. Fig. 7.



COST FACTOR for miscellaneous items. ENR index = 700. Fig. 8.

(less the incremental cost of alloy).

t = total cost of tower shells (less incremental cost of alloy).

f = total cost of field-fabricated vessels (less incremental cost of alloy).

Any vessel with an inside diameter larger than 12 ft. should be considered as field fabricated unless specifically designated as shop fabricated.

The equations for F_L, F_P, and F_M were derived by statistical analysis of data from 42 separate processing units, the Gulf men explained. They can be readily solved by the use of Figs. 6, 7, and 8. A sample calculation is shown in Table 2.

Here's a summary of the statistical results from data on the 42 units:

Standard deviation of F_L	0.3307	field labor
Standard deviation of F_P	0.1878	piping
Standard deviation of F_M	0.3067	miscellaneous
Standard deviation of I/E (%)	16.4	total direct investment
Standard deviation of I/E (%)	12.4	total direct investment

In comparing a calculated investment with one from an outside source, it is important that the two estimates include comparable direct and indirect costs as well as the same items of equipment, Gulf men said. Normally, the factor E, which represents indirect costs, is given a value of 1.4 which is broken down as follows:

Engineering and supervision	15%
Overhead and profit	15%
Contingencies	10%

However, for processes under development, this factor can be expected to differ from that for well-established processes. The speakers explained that, since evaluation of this factor is less accurate than their correlations for direct plant investments, estimates should normally be compared on the direct-cost basis: $I/E = A(1+F_L+F_P+F_M)+B+C$.

Care should be taken to determine what direct costs are included in the quoted estimate, and what, if any, indirect costs are included. If a packaged auxiliary unit such as a gas-purification unit or oxygen generator is included in the plant specifications, it is preferable to back out the cost of this unit from the estimate before comparison.

In estimating investments for several chemical plants containing a high proportion of alloy equipment, Gulf found that including the incremental alloy cost in the basic equipment cost, A, resulted in an excessive installation estimate.

The reason for this is that the use of alloys greatly increases the FOB cost of equipment, but has little effect on that portion of the installation costs accounted for by erection labor, foundations, instruments, insulation, etc. Therefore, the incremental alloy cost has been eliminated from the installation-factor expression, $A(F_L+F_P+F_M)$, by appropriate definition of the A term.

For high-temperature service, alloy materials are often used either because they are more economical than carbon steel at the given conditions, or because carbon steel is inadequate from a physical standpoint. In such cases, the cost of these alloys should be considered as a basic equipment cost rather than an incremental alloy cost.

Giving an example, Gulf's experts said that the cost of a reactor shell designed for 950° F. service and fabricated of Grade A-301-B low-alloy steel should be included in the basic equipment cost term, A. However, they said, the cost of an alloy liner or alloy cladding for this shell should be included in the incremental alloy cost, C. In addition, for the sake of convenience, admiralty heat-exchanger tubes and naval brass tube sheets should be included in basic equipment costs.

TABLE 1—COSTS FOR VARIOUS BUILDINGS

Type—	Jan. 1960 cost, $/sq. ft.
Manufacturing, multistory	21
Office, including furniture	35
Warehouse	10
Laboratory, equipped	58
Machine shop, equipped	*53
Carpenter shop, equipped	†46
Instrument and Electric shops, equipped	‡49
Paint shop, equipped	§57
Pump or Compressor house	¶23

*Equipment is about 40% of total; building height is about 26 ft. †Equipment is about 20% of total; building height is about 12 ft. ‡Equipment is about 25% of total; building height is about 12 ft. §Equipment is about 6% of total; building height is about 12 ft. ¶Equivalent to about $20/driver horsepower; 12-ft.-high steel frame, corrugated asbestos siding and roof, concrete foundation, utilities, and plumbing.

SAMPLE CALCULATION

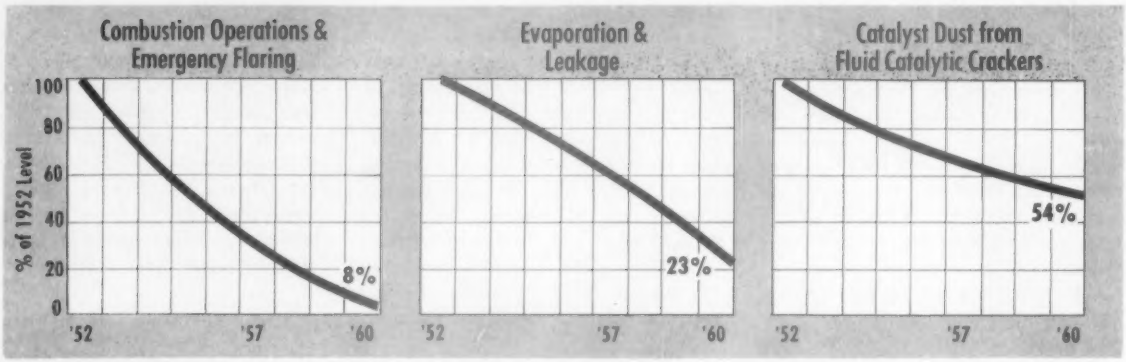
	Cost calculated on carbon steel basis (1)	Total calculated cost (including incremental alloy) (2)	Incremental cost of alloy (2) − (1)
1. Summary of FOB Costs			
Towers			
Shells, diameter ≧12 ft.	$ 105,100	*$173,800	$142,300
Shells, diameter ≦12 ft.	31,500	*249,000	46,000
Total trays and internals	203,000	.....	.....
Drums			
Diameter ≧12 ft.	41,300	.....	.....
Diameter ≦12 ft.	51,000	.....	.....
Miscellaneous vessels			
Shells, diameter ≧12 ft.	.....	.....	.....
Shells, diameter ≦12 ft.	161,000	.....	.....
Total internals	22,500	.....	.....
Heat exchangers	564,900	.....	.....
Pumps	74,000	.....	.....
Pump drives	58,400	.....	.....
Compressors	760,000	.....	.....
Miscellaneous FOB equipment	29,100	.....	.....
Total of FOB costs	$2,101,800		$188,300
2. Summary of Erected Equipment Costs			
Fired heaters		182,000	
Tankage		5,300	
Total of erected equipment costs		$187,300	

$A = \$2{,}101{,}800$
$B = 187{,}300$
$C = 188{,}300$
$p/A = (74{,}000+58{,}400)/2{,}101{,}800 = 0.063$
$e/A = 566{,}900/2{,}101{,}800 = 0.269$
$t/A = (105{,}100+31{,}500)/2{,}101{,}800 = 0.065$
$f/A = (31{,}500+51{,}000+161{,}000)/2{,}101{,}800 = 0.116$

$I/E = A(1+F_L+F_P+F_M)+B+C$
$I/E = 2{,}101{,}800(1+0.822+0.479+0.532)+187{,}300+188{,}300$
$I/E = \$6{,}330{,}000$
$F_L = 0.822$ (Fig. 6)
$F_P = 0.479$ (Fig. 7)
$F_M = 0.532$ (Fig. 8)

3. Calculation of Direct Investment I/E

*For FOB equipment, only those items which contain incremental alloy, as defined in the text, need be listed in this column.



REDUCTION in flaring, evaporation, leakage and dust emission shows . . . Fig. 1

How Humble cut volume of pollutants

D. H. STORMONT
Refining Editor

REDUCING air pollution at the Bayway refinery of the Esso Standard division of Humble Oil & Refining Co. is going to be much more difficult in the future.

Reasons for this are simple. Most obvious sources of pollution have been corrected already. Further reductions can and will be made, but the potential is only about 20% of that in 1952. Thus future improvements will have to deal with much smaller sources of pollution.

As the 168,000-bbl. per day plant is located in the highly populated area of Linden, N. J., the problem of air pollution has long been recognized. As long ago as 1925 a study was made and steps taken to curb pollutants then considered offensive.

Antipollution efforts have been intensified since 1952. At that time a survey was made by Stanford Research Institute. Results of this study were combined with knowledge Esso engineers had developed on the techniques for locating, measuring, and eliminating various pollutants. Breaking down the sources it was found that combustion operations were accounting for 52% of the total, evaporation losses 32%, and those connected with fluid catalytic cracking 16%.

It is from this 1952 bench mark that Esso is now judging its progress toward making Bayway free of air pollution. Since then, as accompanying charts (Fig. 1) show:

. . . **Combustion operations** contributing to pollution are down to 8% of the 1952 level.

. . . **Evaporation and leakage losses** are down to 23%.

. . . **Catalyst losses** have been cut to 54% of the 1952 level.

Net result of the program—about an 80% reduction in the total volume—has been to completely change the 1952 picture. Pollutants associated with cat cracking now account for approximately 40% of the total. Combustion pollutants account for almost 20%, whereas 8 years ago they constituted 50%. Evaporation and leakage losses are about the same percentage-wise, roughly 35%.

Combustion losses. As the above data indicate, the most effective battle has been fought against pollutants resulting from combustion operations. These include (1) blue haze which is formed when sulfur trioxide contacts water vapor in the atmosphere, (2) sulfur dioxide, invisible but having a strong odor, (3) smoke, and (4) emergency flaring of hydrocarbons during upsets.

The problem of sulfur compounds was largely solved by reducing the amount of sulfur in the fuel fired to furnaces. Hydrogen sulfide and acid sludges which years ago were burned, now are taken by a neighboring chemical company and converted into elemental sulfur and sulfuric acid.

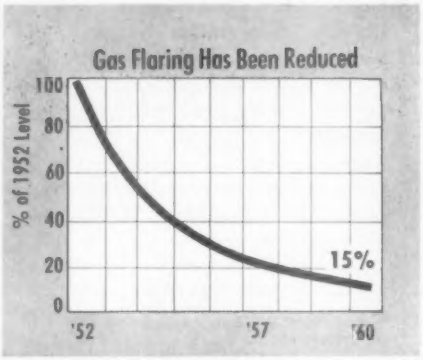
Smoke emissions have been reduced in a number of ways. Through using draft gages, damper controls, stack-gas oxygen analyzers, and automatic feed control of fires, furnaces are fired more efficiently.

Not only has smoke from flares been eliminated, through installation of smokeless flares, but also the amount of emergency flaring has been greatly reduced. As an accompanying chart (Fig. 2) shows, the volumes flared today are only 15% of those 8 years ago.

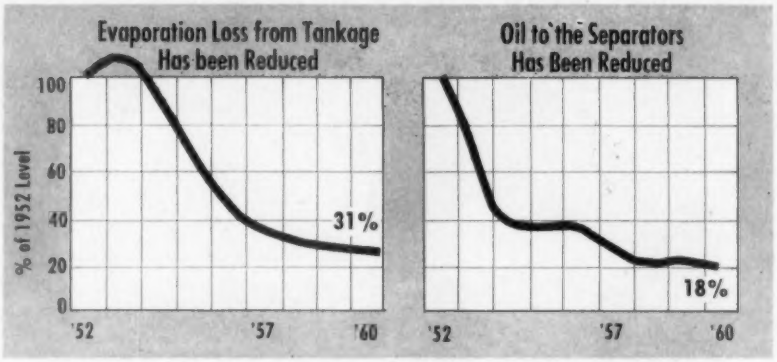
This reduction has been made along two lines. An intensive effort is made to achieve smoother operations and fewer upsets. The other is to monitor all sources feeding vapors to the flares. Small leaks in safety valves, gas coolers, and other process equipment are located and eliminated. A hot-wire anemometer, capable of measuring very small gas flows, makes the job of locating small leaks much easier.

. . . **Smoother operations** are being sought in a variety of ways. A combustion-control program includes routine checking of combustion conditions and efficiency in each process furnace. Supplementing this is a daily inspection of their mechanical condition.

Daily inspections are not limited to the furnaces; 18 inspectors daily check the entire plant, seeking to detect mechanical malfunctions in



BY MONITORING all sources of vapor to flares, small leaks can be detected and eliminated. This has helped cut the amount of gas flared to 15% of that required 8 years ago. Fig. 2.



REPLACING cone roofs on storage tanks with floating roofs has been the chief factor in cutting evaporation losses 70% below the 1952 level. Another source of evaporation, oil in the sewers, has been cut to 18% of that in 1952. Fig. 3.

by 80% in 8 years of effort

. . . and the curve is still declining

their early stages. In this way it often is possible to continue smooth operations by making on-stream repairs.

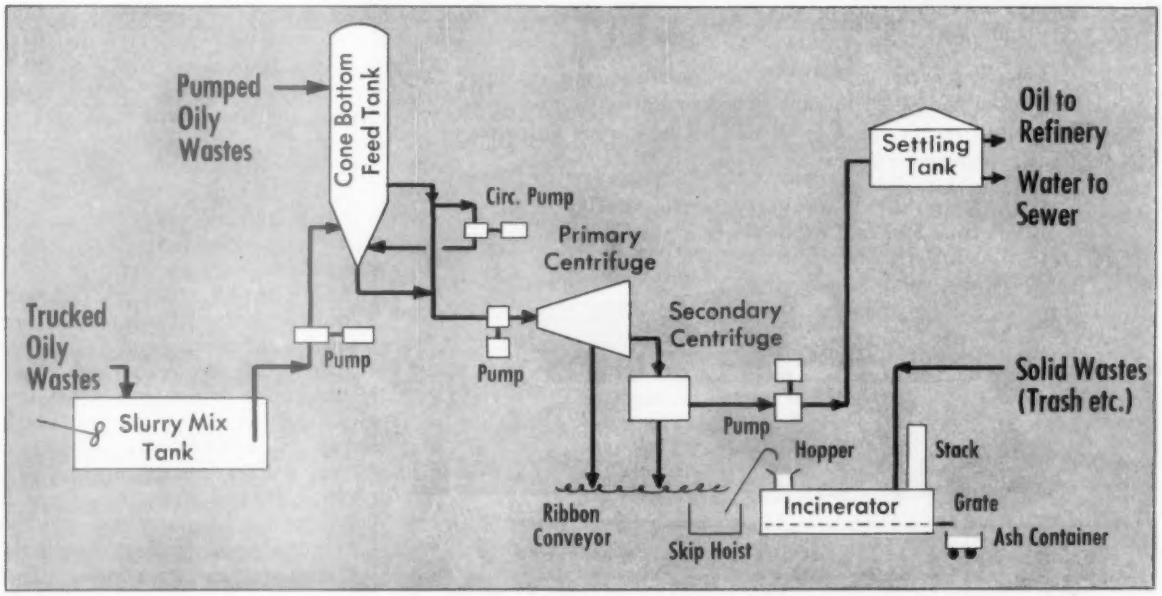
Other technical people are assigned to cover each of the units from the process viewpoint. They work closely with the unit supervisors in day-to-day operations, and plan how to avoid upsets as changes are made throughout the refinery.

A more recent development is an instrument-control survey, aimed at improved control instrumentation on all units. Here again, better control means fewer upsets and less air pollution.

Another source of smoke in earlier days was that connected with the open burning of trash and rubbish. This has been corrected by the installation of a $700,000 incinerator, discussed later in connection with the disposal of oily wastes.

Evaporation and leakage losses. Pollutants involved in this category are hydrocarbons, H_2S, and various mercaptans coming from such sources as tankage, sewers, separators, leaking safety valves, pump glands, and other leaks and spills.

Tank-evaporation losses today are about 70% below the 1952 level (see Fig. 3). Installing floating roofs on tankage formerly equipped with cone roofs was responsible for most of the reduction. A continuing tank-repair program is aiding in



WASTE-DISPOSAL UNIT can handle not only oily wastes such as sludge and filter clay, but also trash, such as waste paper and scrap lumber. Fig. 4.

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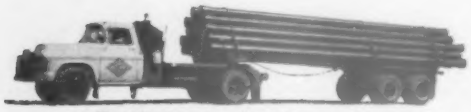

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the level being kept down.

Other evaporation sources have been cut down through application of the policy that the best control method is to keep oil and other contaminants out of the sewers. As shown in Fig. 3, the amount of oil going to the separators today is only 18% of that in 1952. Involved are such steps as:

. . . **Use of vacuum trucks** to pick up accidentally spilled oil, doing so as quickly as possible to minimize evaporation.

. . . **Closed preseparators** for skimming oil from sewer water before it enters the open API separators.

. . . **Spent caustic** is kept out of the sewers; it either is sold or disposed of otherwise.

. . . **Closed water-drawoff** facilities recover oil and products formerly permitted to reach the sewer.

The latter consists of piping tied to a common recovery tank. Whenever water is bled from a storage tank, the water and commingled oil go to a small tank where better separation is achieved. The practice of draining water until oil appears is still followed. But now the oil doesn't enter the sewer.

New incinerator . . . The waste-disposal unit mentioned earlier was designed to properly burn materials which were previously burned in open fires or were buried. It also processes oily solids and sludge which formerly found their way into the separators and contributed to evaporation losses there.

The unique disposal unit is divided into three basic sections: One is for oily wastes, one for trash, and the incinerator section (see Fig. 4). About 13 tons of trash and up to 800 bbl. of oily waste are handled daily. Operation normally is around the clock, 7 days a week.

Oily wastes, such as cleanings from oil-storage tanks, separators, sewers, and filter clays, are brought to the plant in vacuum and dump trucks. These materials are discharged into a slurry tank where they are mechanically agitated to form a slurry which is pumped to a cone-bottomed feed tank. There it is joined by liquid waste material from slop-oil treating operations. The mixture is continuously circulated to maintain suspension of the solids.

Waste materials withdrawn from the bottom of the tank are pumped to two centrifuges operating in series. Oil and water removed are pumped to a settling tank. About 30 bbl. of oil daily is recovered here and pumped back to the refinery.

Solids from the centrifuges (about 85 tons daily) drop onto a ribbon conveyor and move to a skip hoist, which elevates them to a feed hopper atop the incinerator. From there they pass through a star feeder into the incinerator.

In the incinerator the oily waste joins the trash—waste paper, garbage, scrap lumber, and other refuse—which gravitates from another hopper above the incinerator. Both are burned on a special grate which oscillates back and forth. Motion of the grate, coupled with intermittent abrupt stops, causes the burning waste materials to travel the length of the grate. Upon reaching the outer end, the ashes drop into dump trucks and are hauled away for use as fill material.

As air-pollution control is a main object of the unit, care is taken to assure that combustion is complete. By supplementary gas firing, a temperature of 1,600°-1,800° F. is automatically maintained. A smoke-intensity monitor also actuates burners in the secondary-combustion chamber, functioning as necessary to keep the smoke density below Ringelmann 2.

Catalyst dust losses have been reduced to such an extent that 99.995% of the catalyst circulated is recovered. This is accomplished through (1) control of operating equipment, (2) increased capacity of the catalyst recovery system, (3) use of stronger, improved catalyst, and (4) elimination of waste-heat boiler cleanings.

Future improvements. Although the rate of improvement lessens as more and more sources are brought under control, abatement activities at Bayway will continue. Among projects now being considered are:

... **Recovery of flare gases.** Excess gas flared during upsets would be collected and used for steam and power generation at the utility plant.

... **Consolidated oil-recovery tanks.** Evaporation losses from oil recovery tanks would be less if consolidated in one tank.

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BOOKS

OIL FOR THE WORLD. By Stewart Schackne and N. D'Arcy Drake. Published by Harper & Bros., 49 East Thirty-third Street, New York City 16. 143 pp. $2.50.

Here is a taste of the oil business for someone whose only contact with petroleum comes when he drives into a service station.

A book for friends who are always asking questions about the industry, this volume deals with basic information, from finding oil to marketing it. Written in nontechnical language, the book deals with the fundamentals of petroleum. Not a "children's" book, the volume is aimed at the average reader who doesn't know how the oil business operates.

This book has been translated into seven different languages, and this is the second revised edition in English. Photographs, maps, diagrams, and charts illustrate the text.

ASTM STANDARDS ON PETROLEUM PRODUCTS AND LUBRICANTS. Prepared by ASTM Committee D-2 on Petroleum Products and Lubricants. Published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3. 1,125 pp. List price: $9.50. Price to ASTM members: $7.60.

This latest compilation of ASTM standards is published in two volumes. Volume I contains those methods of test specifications, definitions, charts, and tables which find most frequent use in the testing of petroleum products and lubricants. Included also are several general specifications for laboratory testing apparatus prepared by Committee E-1 on Methods of Testing.

Included in Volume I only are a number of proposed methods of test which are published in draft form as information only for the purpose of soliciting comments. Such proposed methods have not been formally approved by the Society and are distinguished from the standards and tentatives by the absence of an ASTM serial designation.

Volume II contains a number of related standards of interest to the petroleum industry prepared by other ASTM technical committees and cover such materials as gaseous fuels, industrial aromatic hydrocarbons, bituminous materials, electrical insulating oils, waterproofing materials, wax polishes, etc.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

Special sucker-rod pumps

BY JOSEPH ZABA

DIFFERENT well conditions mean different designs of conventional sucker-rod pumps. Some of these have been mentioned in the preceding installments. In addition, some special pumps have been developed and at least a few of these will be briefly considered.

Large-volume pumps. Probably the oldest of the sucker-rod pumps designed to handle large volumes of fluid is the casing pump. The fluid is pumped to the surface through casing instead of tubing.

A casing pump is run into the well on sucker rods. Packer on top or bottom of the barrel provides the packoff between the pump and the casing at any desired setting depth. Fluid is discharged from the pump into the casing above the packer. Maintaining packoff during the pumping operation is accomplished by: (1) special packers which use the hydrostatic head in the casing to maintain the seal, or (2) set-down weight with special anchoring devices or with a tail pipe.

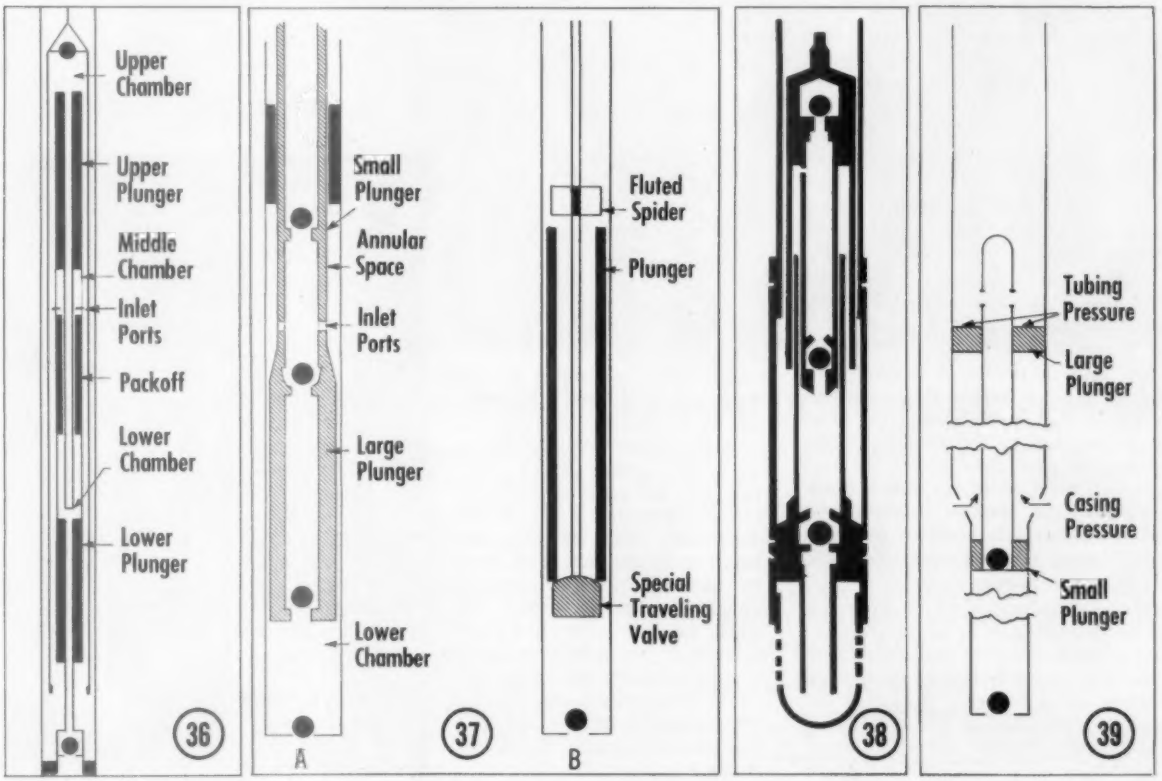
One of the problems with casing pumps is rod wear on casing. Holes can be worn in casing by rod buckling after only a few weeks of operation. Rod guides will help or a partial tubing string can be run to act as a guide for the rods.

A newer development in this field is the double-displacement pumps. This type combines the ease of removal of a rod pump with displacement larger than that of a tubing pump for any given size of tubing. For instance, one such pump for 2½-in. tubing displaces theoretically 63% more fluid than a rod pump and 29% more fluid than a tubing pump with the same size of tubing.

Double-displacement pumps get their increased capacity from two plungers placed in tandem and operated simultaneously by the rods. Thus, the "effective" plunger area of a double-displacement pump is larger than that of tubing pump in the same size tubing.

Fig. 36 shows schematically, an insert, bottom-holddown, traveling-barrell pump consisting of two plungers, two tubes, and a packoff assembly sliding on the tube of the upper

SPECIALTY PUMPS have been designed to handle unusual down-hole conditions. Fig. 36 is a typical large-volume pump of the double-displacement type. Effective plunger area is larger than that of a tubing pump in the same size tubing. Gas lock can be controlled by the pumps shown in Fig. 37. In Fig. 37-A the gassy fluid goes through a two-stage compression to prevent any delay in valve operation. Fig. 37-B shows a pump equipped with valves that open independent of pressure. Fig. 38 is a concentric tube pump that will handle sand with little difficulty. High-viscosity crude can be handled best by a pump of the type shown in Fig. 39. A large-diameter auxiliary plunger performs the actual pumping of the well. This pump, and the one in Fig. 36, will give high rod loads.



plunger. The two plungers and the packoff form three chambers within the pump. The middle chamber is in communication with the tubing, through ports above the packoff and furnishes means for equalizing pressure across the upper plunger.

On the upstroke the fluid enters the lower and upper chambers through the standing valve and the respective pull tubes. The fluid from the middle chamber is displaced into the pump-tubing annulus.

On the downstroke the traveling valve opens. The fluid from the upper chamber enters the tubing. The fluid from the lower chamber is displaced through the upper pull tube and enters the upper chamber and the tubing. The fluid from the pump-tubing annulus reenters the middle chamber.

Increase in amounts of fluid handled by the double-displacement pumps results in increased loads which must be considered. These increased loads impose certain depth limitations on these pumps, commensurate with increase in rod stretch and stress.

Pumps for gas conditions. A group of pumps developed for gas-interference conditions employs the principal of a two-stage compression of the gassy fluid within the pump, Fig. 37A. Two plungers are used, the large lower plunger and the smaller upper plunger packed off in the top of the barrel. This arrangement forms two chambers within the pump: (1) the lower chamber below the lower plunger and (2) the upper chamber, the annular space between the smaller plunger and the barrel.

On the downstroke the annular space increases, the upper plunger valve closes and the lower plunger valve opens. The gassy fluid is transferred from the lower to the upper chamber. On the upstroke, the annular area being smaller than the lower chamber, the fluid in the annular area is compressed to a pressure higher than that in the lower chamber. If this pressure is sufficient to open the valve of the upper plunger the fluid is transferred to the tubing. If this is not the case, then during the successive strokes additional fluid is transferred to the annular chamber and this fluid is compressed to progressively higher pressure, until the valve of the upper plunger opens.

Main problem of gas interference is the delayed opening of the traveling valve which does not take place until the fluid in the barrel is compressed to the pressure higher than that exerted by the column of fluid resting on the valve. Special pumps are available which employ mechanical means for instantaneous opening of the traveling valve at the beginning of the downstroke, independently of the pressure differential across the valve.

The principle of one such arrangement is shown in Fig. 37B. A special traveling valve is attached to the rod string through a rod passing through the plunger. At the beginning of the upstroke the valve seats in the plunger and pulls it on the upstroke. As the motion is reversed, at the beginning of the downstroke, the valve immediately leaves its seat.

The downward motion of the plunger is brought about by the pushing action of a fluted spider located on the rod a short distance above the plunger, when valve is closed.

Other special pumps. Over the years severe sand-pumping conditions have plagued certain areas, like the Texas-Louisiana Gulf Coast, where oil is produced from unconsolidated or semiconsolidated sands. With advent of hydraulic fracturing the problem became practically universal, because of possible backflow of the propping sand. In some wells this problem may be temporary.

For severe sand conditions one pump design depends on both the fluid seal and on an unusually long distance the fluid has to travel to slip past the plunger, to secure proper plunger seal. Two concentric tubes, with inside tube acting as a plunger, slide during the pumping motion over the third, stationary tube, Fig. 38. The relatively loose clearances between the tubes permit handling of abrasive materials without scoring. The length of the seal, and what follows the length of the pump, must be increased with the increased pumping depth.

For viscous crudes a pump has been developed which uses the pressure of fluid in the tubing to furnish the force pushing the plunger downwards on the downstroke. This is accomplished by an auxiliary plunger, connected by a hollow tube to a smaller plunger which performs the actual function of pumping, Fig. 39. The bottom of the larger plunger is exposed to the casing pressure.

The force available for pushing the plunger down equals the difference between the tubing and casing pressure and acts over the area which equals the difference between the areas of the two plungers.

In calculating the installation with this type it should be remembered that the polished-rod load is determined by the size of the larger plunger. The pulldown force must be considered in calculating the counterbalance. The pump displacement, torque on the reducer and range of loads are found by the size of the smaller plunger.

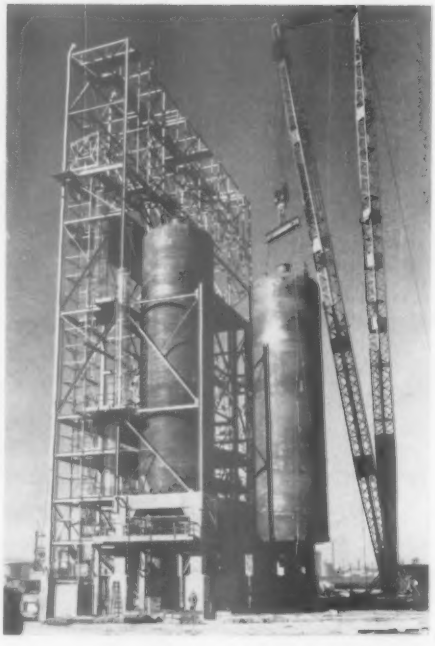
Slim-hole and dual-zone pumps will be considered in the respective discussions of the slim-hole and dual-zone pumping.

Novel method used to move coke drum

A GUY DERRICK lifts the third of four coke drums into place at Mobil Oil Co.'s Beaumont, Tex., refinery. The drum being lifted hides from view a second drum.

The internal clad steel drums are 19 ft. i.d. and 85 ft. long. Completion of the 20,000-bbl. coker unit is scheduled for the spring of this year. Lummus Co. is contractor.

A novel method was used to move the drums which were too large for either highway or rail transportation. The drums were shop built and stress-relieved by Wyatt Industries, Inc., Houston. Heavy equipment moved the drums during low traffic hours from Wyatt's plant to Port of Houston. There the heavy equipment was driven directly onto waiting barges for the trip to the construction site via the Intracoastal Waterway system.



Photographed at American Oil Co., (Wood River, Ill., Refinery)

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Basic in catalyst chemistry

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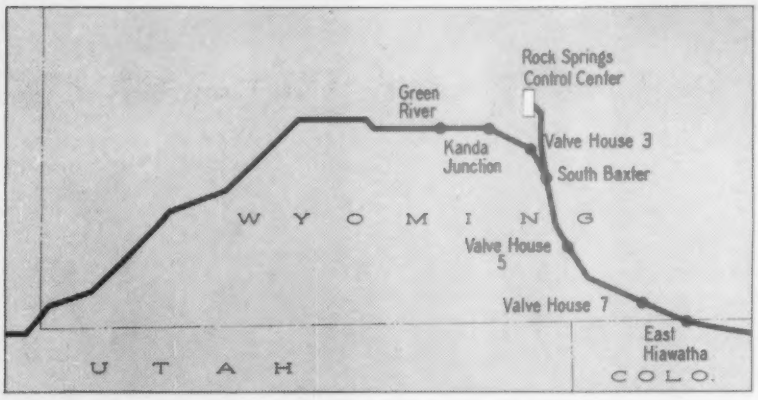
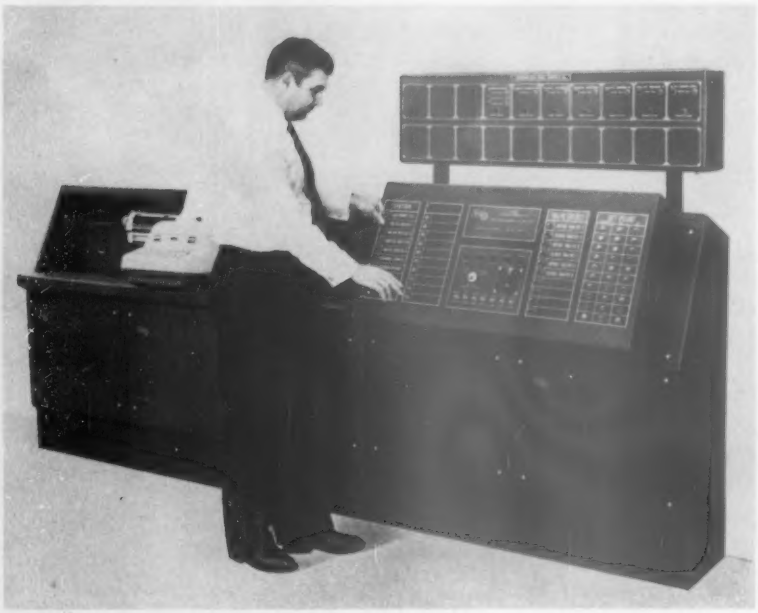


VALVE POSITION control and pressure measurement for seven stations is exercised from Mountain Fuel Supply Co. control center in Rock Springs, Wyo. The line, built in 1929, handles about 110 M.M.c.f.d. through 500 miles of transmission line. Fig. 1.

BY H. C. BOZEMAN
Journal Staff Writer

Main-line block valves



CONTROL PANEL at Rock Springs. Valve position is displayed on the upper panel. Operator is activating the station selector and then will command the station to open or close the valve. Time is controlled from the timer to the left of the Valve Select panel. A typewriter logs station conditions on printed forms. Fig. 2.

are remotely controlled

Pressures at 15 different points also indicated by supervisory control system being installed by Mountain Fuel Supply Co.

NINE main-line block valves will be regulated by a solid-state, electronic supervisory control system which Mountain Fuel Supply Co. is installing. The system also indicates the opening and closing of the valves and provides remote indication of 15 different pressures.

It will enable dispatchers at Rock Springs, Wyo., to locate line breaks quickly and to speed repair crews to the location. Mountain Fuel Supply gathers gas in Utah, Wyoming, and Colorado and distributes it to communities in Utah and Wyoming. Many of its stations are inaccessible in winter which makes a remote-control system highly desirable.

The key to the system is telemetering over part of the audio spectrum of the company's telephone lines. This is in addition to voice transmission over another part of the audio.

It is the first extensive use of electronic controls by Mountain Fuel, but, very probably, not the last. The system is designed for expansion and the company plans to automate at least one compressor station this year.

Cost of the initial system is about $120,000 with roughly half going into electronic equipment. It was designed and built by SIE Division of Dresser Electronics.

Control Functions

Supervisory control of block-valve position is needed to check for line breaks and line pack. Location of the valves, three at Green River and one each at the other, is shown in Fig. 1.

The tools with which dispatchers do these tasks are remote reading of valve position and pressures (line pressures and differential pressures across orifices and valves), and con-

trols to open and close valves, Fig. 2.

The control system does these things:

- Provides supervisory control to open and close block valves.
- Shows the status of valves.
- Automatically logs system status on a preset schedule.
- When off-limit conditions are detected it automatically makes a complete station printout, indicating off-limit readings in red.
- On command, it makes a manual printout.

The supervisory control provides continuous monitoring by a scan every 30 seconds that compares reply readings with preset limits. The limits are adjustable at the supervisory control rather than at remote points.

All communications originate from the supervisory control which interrogates the stations for reply.

SIE says the high scan rate is made possible by solid-state logic circuits. Etched circuit boards are used in the electronic circuits. Moving parts are used only on infrequently used portions of the control.

Electronic System

Mountain Fuel-owned telephone lines are used. Telemetering over 2,700 c.p.s. to 3,300 c.p.s. band is used for communications between supervisory control and stations. The audio spectrum below 2,700 c.p.s. is used for voice communications.

Telemetering is by frequency shift keying to a binary digital code with a parity check. Center frequency is about 3,000 c.p.s. The "1" bit is sent at 3,210 c.p.s. and the "0" bit at 2,780 c.p.s. which is the standard filter spacing for that frequency.

All controls operate on d.c. power from batteries that are trickle charged continuously from an a.c. source. The stations have sufficient reserve battery power for 24-hour operation after a.c. power failure, and Rock Springs has 4-hour reserve battery power.

A switch opens when the batteries reach a critical low voltage. Some of the remote stations without electric-utility connections have small a.c. generators.

The electronic and power-supply equipment is designed for −20° F. operation in the unheated stations. High-gravity electrolite is used in the batteries to prevent freezing.

Electronic components at each station convert analog pressure readings to digital for encoding into binary for transmission to supervisory control. Signals received from supervisory control operate in reverse.

Mountain Fuel will maintain the control system. It feels that solid-state electronics are the most reliable of the electronic systems evaluated and should require less servicing. Key maintenance personnel have finished a 2-week factory maintenance-training course.

Nelson Refinery Cost Indexes

Published in the first issue each month in the Technology-Operations Section.

Compiled by W. L. Nelson, Technical Editor and petroleum refinery consultant, Tulsa.

Charts of the indexes are published each year in a late January or early February issue.

Indexes of selected individual items of equipment and materials are also published on the Costimating page in the first issue of the month of January, April, July, and October.

Refinery Construction Cost Index (1946 Basis)

Explained on page 101 of the issue of August 5, 1957.

	1950	1954	1957	1958	1959	Sept. 1960
Pumps, compressors, etc.	138.2	166.5	206.7	214.7	226.5	228.8
Electrical machinery	134.9	160.0	188.9	192.7	195.8	193.8
Internal-combustion engines	126.0	150.5	173.9	178.3	178.5	179.5
Instruments	127.8	154.6	187.4	194.9	201.0	204.3
Heat exchangers	140.0	171.7	203.6	181.2	178.9	196.0
Miscellaneous equipment average	*126.2	160.7	192.1	192.4	196.1	200.5
Materials component	149.5	174.6	201.9	204.2	207.8	207.6
Labor component	144.0	183.3	208.6	220.4	231.6	†245.2
Nelson construction index	146.2	179.8	205.9	213.9	222.1	230.2

*Used in computing the Nelson Index until April 1952. †Converting labor component to 60% skilled labor rather than 50:50. Conversion will be complete by May 1961.

Refinery Operating Cost Indexes (1956 Basis)

Explained on page 171 of the issue of June 1, 1959.

	1946	1952	1954	1958	1959	Aug. 1960
Fuel cost	49.6	81.0	86.5	102.1	103.5	114.0
Labor cost	73.1	88.7	90.9	105.0	102.3	98.5
Wages	52.4	81.5	88.7	105.4	111.5	113.4
Productivity	68.3	90.2	97.1	100.3	109.0	115.2
Investment, maintenance, etc.	51.2	83.6	92.0	109.5	113.7	117.8
Chemicals cost	37.0	72.1	85.7	104.4	107.8	113.3
Operating cost indexes:						
Refinery	58.5	80.5	88.7	105.8	106.8	108.8
Process units‡	62.9	82.2	88.4	105.8	106.0	107.4

‡Add separate index for chemicals, if any are used.

IN THIS ISSUE:

"How two major companies go about

Estimating Investment Costs"

. . . starts on page 120

Here are tips on combustion in the refinery

ALL BURNERS should remain lighted. If some of the burners are cut out, there should be a good reason before you allow them to remain out of service. Tube-metal temperatures should be watched carefully to see that certain sections of the fire box are not being overfired. If there is anything mechanically wrong with the burner, it should be repaired and returned to service as soon as possible.

Gas burning. Generally a good gas flame will be short and blue in color. To shorten flame length, adjust either or both of the following: (a) Increase opening of primary shutter, (b) Decrease opening of secondary-air doors. If the fuel gas is dry, the flame will become short and nonluminous in a hot furnace. In a cold furnace the flame will be blue.

To lengthen the flame, adjust either or both of the following: (a) Decrease primary air. (b) Increase secondary air. The flame will become very yellow and luminous.

Oil burning. Generally a good flame will be "clean," yellow, and from 3 to 10 ft. long, depending on the furnace.

To shorten the flame, either or all of the following adjustments may be made: (a) If it is a combination burner, open gas primary-air shutter, (b) Open secondary-air doors, (c) Increase steam.

To lengthen flame, do the reverse.

Things to watch. When using gas, if the burner flashes back without apparent reason, check these items. They could be causing the trouble.

1. Jet orifice is too small or has become plugged.
2. Fire-box pressure is too high.
3. Nozzle base is too large or has burned out.
4. Fuel gas contains too much air.
5. Primary-air inlet is open too wide.
6. There is to much hydrogen in the fuel gas (decrease primary air).

Remember that the burner nozzzle may overheat if fire-box pressure is too high.

The venturi neck will burn out if the burner is allowed to pop back at the jet.

When burning oil, the flame may be widened or shortened by using a different tip. But do not allow the flame to impinge on the burner muffle block. If it does, the tip may have too wide a nozzle or else the flame is too short. However, a gently glancing flame on the muffle block promotes more stable ignition.

On upfired furnaces using combination burners, it is possible for unburned oil to drop back into the gas venturi, causing it to become plugged. If a changeover to gas firing is then made, the gas will blow out the venturi under the burner and an explosion may result. Always check to see that the gas venturi is free before using a gas burner.

Furnaces and tubes. The stack damper on most refinery furnaces should be set to give from 0.05 to 0.15 in. of water (vacuum) draft. By draft we mean the difference between atmospheric pressure and the lower pressure inside the furnace.

If smoke is seen coming from the stack, it may indicate either that there is incomplete combustion or that there are leaks in the convection-section tubes. When firing fuel gas, no smoke should come from the stacks. When firing oil, a slight smoke haze coming from the stack indicates good combustion.

Most furnaces are equipped with pressure gages on the coil inlet and outlet. Some indication of furnace coking can be obtained by periodically checking coil pressure drop. Other factors to be taken into consideration are the feed rate, temperature, and type of feed stock.

Some of the troubles normally experienced in furnace operation, along with causes and solution, are shown in Table 1.

This material taken from process-training-program manual, Bayway, N. J., refinery of Esso Standard Division of Humble Oil & Refining Co.

TABLE 1—POSSIBLE FURNACE BURNER TROUBLES

Trouble	Possible cause	Solutions
Burners go out	1. Fuel-air mixture too lean	1. Close down on dampers and/or close down combustion air.
Flame flashbacks or backfire	1. Low fuel pressure at burner	1. Reduce burner spud (tip) size. If operating at reduced rates, shut down a burner, and increase firing rate to the other.
	2. Low furnace draft	2. Increase damper opening.
Insufficient capacity	1. Low flow of fuel	1. Increase fuel flow.
	2. Burner spud too small	2. Increase burner spud size.
Erratic flame pattern	1. Lack of combustion air	1. Adjust air dampers.
	2. Excessive firing	2. Reduce firing rates.
Pulsating fire or "breathing"	1. Lack of draft	1. Flame alternately ignites and goes out, sometimes with almost explosive force. **Reduce firing rate immediately.** Check stack dampers.
	2. Fuel rate too low	2. Shut off burner or increase fuel rate.
Flame too long (Oil burner)	1. Too little combustion air	1. Open secondary air doors.
	2. Too little atomizing steam	2. Increase steam.
Flame too short (Oil burner)	1. Too much combustion air	1. Shut secondary air doors.
	2. Too much atomizing steam	2. Decrease steam.
Stack temperature too high	1. Too much combustion air	1. Adjust damper for proper draft. Adjust primary and secondary air ports.
Excessive stack smoke	1. Loss of atomizing steam	1. Check source of steam trouble and switch to gas burning.
	2. Increased fuel rate without air adjustment	2. Adjust air doors and/or damper.
Tube metal temperatures high	1. Tubes are dirty	1. Adjust feed distribution through tubes. Cut feed and firing rate.
	2. Flames are impinging on tubes	2. Adjust flame pattern.

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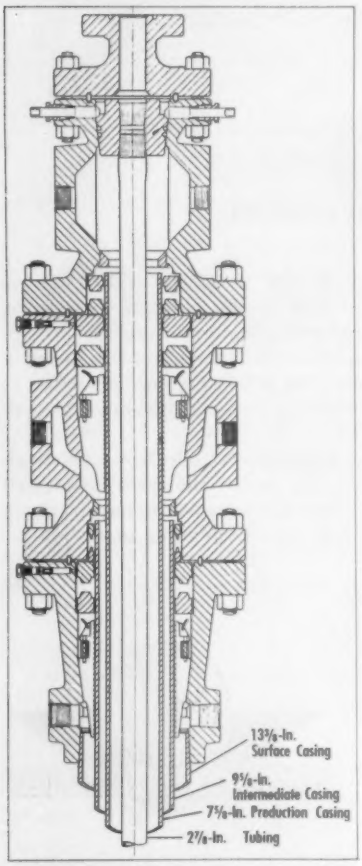
How to reduce casing and tubing load on surface string

• **Deep wells and thick-walled pipe may mean too much weight on your surface casing. Here are some ways to help relieve part of this load, and avoid buckling or thread failure.**

BY JOHN S. SPENCER
National Supply Co., Odessa, Tex.

API STANDARDS which establish minimum joint strength are not specific as to the modus operandi for which the strength values apply. In the absence of contradictory published data, it is generally agreed that these API values should not be exceeded in compressively loaded joints.

In practically every case, before a well is drilled today the operator has certain advance information that guides him in the selection of a proper pipe and wellhead program. That is, he knows his approximate total depth, estimated pressures, and the depths to which he will set any intermediate casing strings that might be needed. Required size, weight, and grade of these pipe strings are readily computed from formulas or tables. (Calculations in this article made use of data from Spang Engineering Data Handbook.)



TYPICAL WELLHEAD for a well of the type used in the example. Fig. 1.

The method of casing landing is usually determined in advance, giving the operator the estimated loads in pounds that will be set on the casing and tubing hanger. The combined weights set on all casing hangers, as well as tubing weight hung from the tubing head, are a direct force that is transferred through the wellhead bodies to the surface casing at the point of attachment to the casing head. For this reason, the weight and grade, as well as the joint strength of the surface casing, must be reviewed on the basis of compressive load. This review should be made independently of the design necessary for the surface casing to conform to well conditions and running and landing practices.

To better explain, consider an installation with wellhead connections as shown in Fig. 1. The depths and estimated casing and tubing hanger loads are given in Table 1. These data assume that the pipe is left hanging as it was when it was cemented, and these are mixed strings, already designed for tension, burst, and collapse.

Although the weight effect will be reduced by buoyancy, use of the total weight figure of 687,680 lb. provides a safety factor. These weights are not considered excessive in view of the general practice of setting casing as cemented.[1]

Using tubular handbook joint-strength data, Table 2, we find that 13⅜-in.-o.d., J-55, 68-lb. casing would give a parting load about the same as the estimated total load effect. As there is no appreciable safety factor except buoyancy, an operator would most likely prefer to use 13⅜-in.-o.d., N-80, 72-lb., RT&C casing for the surface string.

In most wells of this depth the 72-lb., N-80 surface casing exceeds the requirements in both weight and grade. Use of such heavier and higher-grade casing causes an increase in completion costs. And this casing might be difficult to obtain on short notice.

In drilling deeper wells, or those requiring more than one intermediate casing string, the total load ef-

TABLE 2—Parting load, 13⅜ in. o.d. RT&C Casing

Weight per ft. (lb.)	Grade	Joint strength (lb.)
48.00	F-25	260,000
54.50	J-55	545,000
61.00	J-55	613,000
68.00	J-55	695,000
72.00	N-80	868,000

TABLE 1—CASING PROGRAM FOR EXAMPLE WELL

String	Size o.d., in.	Setting depth, ft.	Weight on hanger, lb.
Surface	13⅜	1,300	
Intermediate	9⅝	5,000	184,800
Production	7⅝	13,000	428,130
Tubing	2⅞	12,500	74,750
		Total	687,680

fect may rise beyond the range of even the heaviest weight or highest grade of casing made in a particular size.

What's the answer? Several methods allow operators to use surface pipe of lesser weights and grades, or to insure against the failure of the surface pipe at the wellhead body connection or in the surface string itself. The most commonly used are:

1. **Set less weight on casing slips** by slacking off part of the casing weight on the intermediate or production casing string prior to setting the casing hanger. However, as slackoff increases the buckling tendency of the pipe string, causing a possible restriction of passage, and encourages thread failures, this method is least favored by authorities.[1 2 3]

2. **By using a counterbore for weld connection** between the wellhead and the surface casing, Fig. 2, the joint strength figure of a threaded attachment would not be used. The total effect in pounds per square inch would be carried by the cross-sectional or wall area of the surface joint. To calculate this capacity, multiply the wall area by the minimum yield per square inch of the top joint of the surface string.

From a handbook we note that 13⅜-in.-o.d., J-55, 54.50-lb. RT&C casing has a wall area of 15.514 sq. in. Also, J-55 casing has a minimum yield of 55,000 psi. Then

$$15.514 \times 55{,}000 = 853{,}270 \text{ lb.}$$

This is the maximum weight that can be supported by a counterbore for weld surface connection.

Taking the previously mentioned hypothetical load effect on the surface connection of 687,680 lb., note that the use of a much lighter and less-expensive surface pipe still maintains an adequate safety factor.

Use of a counterbore for weld casing flange requires the operator to have a very good "top to bottom" cement job on the outside of the surface pipe. The practice also requires a surface formation strong enough to help support the load effect on the top of the surface casing. If these requirements are not met, buckling of the surface pipe may occur, or a thread may fail on any of the threaded and coupled connections below the surface of the ground.

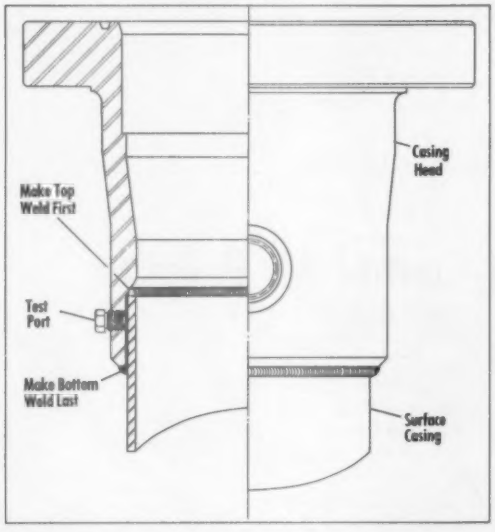
3. **Use of structural support or landing base** anticipates transferral of a portion of the suspended pipe loads into the surface formations through either a reinforced concrete pad or, in marshy or offshore locations, through a larger conductor casing string. Therefore, a lowermost casing head body having an integral reinforced landing or base plate is used. Normally, body members of this type are counterbored to permit "welded" rather than "threaded" attachment to the surface casing, Fig. 3.

Dimensions of the concrete pad should be based on the pipe loads to be suspended and the load bearing value of the surface formations. After the landing base is properly welded to the surface pipe,[4] due care should be taken to assure an effective grout placement between the base plate of the wellhead body and the reinforced concrete pad.

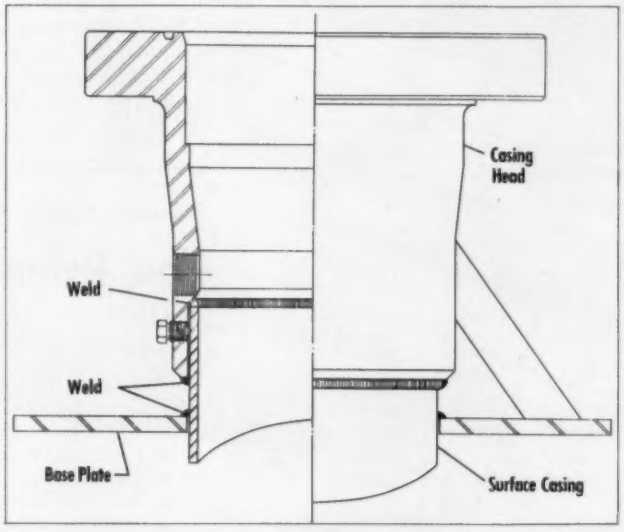
In marshy or offshore locations, a landing base is effectively used by resting the base plate on top of a large conductor casing string. In such a case, the landing base plate is welded to the conductor pipe as well as the surface casing.

The proper use of a landing base prevents overload of the surface pipe connection. In addition, the possibility of failure through buckling effect downhole would be eliminated. However, satisfactory use of a landing base is dependent upon having a sufficient load-bearing surface formation. Fortunately, a large percentage of wells drilled in the United States today do have good load-bearing surface formations.

4. **Use of larger surface casing** or special high-joint-strength thread connections. On extremely deep wells with high surface-connection loads or on wells whose particular



COUNTERBORE on casing head provides for a welded connection between wellhead and surface pipe. The area of metal supporting other casing strings is increased in this manner. Fig. 2.



LARGE STEEL PLATE welded to the casing head transfers part of the casing load to surface formations. Fig. 3.

conditions make it undesirable to use the other three methods, larger surface casing and/or special high-joint-strength thread connections have these advantages:

(a) Larger casing and tubing hanger loads may be supported, allowing the operator to set longer intermediate and production pipe strings "as cemented."

(b) Overload of weaker surface connections below ground level is eliminated if all connections are of the same and sufficient strength.

(c) Surface soil conditions in regard to load-bearing qualities as applied to the landing base method are not a factor.

Note, however, that this method also increases completion costs and would be used only in special instances.

Safety Suggestions

The recent trend toward heavier casing and tubing strings, brought about by deeper wells and the "full tension" method of casing landing, has increased the loads on surface pipe. To eliminate possible failure of the surface string during the completion of oil and gas wells, try these suggestions:

- Take the loads into consideration during the planning stage of medium to deep projects.
- With loads calculated in advance, select a method of relieving any excessive loads that might be met under known or unknown well conditions.
- If no single method gives enough relief, try a combination of methods.

References

1. API Bulletin D-7, June 1955.
2. Peret, J. W., Casing Landing Methods, Petroleum Engineer, October 1953.
3. Texter, H. G., Casing Strain After Cementing, The Oil and Gas Journal, p. 72, April 8, 1948.
4. API Standard 6-E, March 1958.

New low-cost inhibitor for amine-sweetening systems

CORROSION in amine gas-scrubbing systems can be drastically reduced by the addition of sodium metavanadate. This has been proven by experimental and plant data obtained with the iron capacity and rate penetration tests, according to H. R. Grady, of Vanadium Corp. of America.

Test results. The corrosion-inhibiting properties of sodium metavanadate in alkaline monoethanolamine solution is shown in the following test results:

Solution	Origin	Iron capacity, p.p.m.	% Sodium vanadate
15% MEA	Rich	110	None
15% MEA	Rich	196	None
15% MEA	Rich	24	0.1
15% MEA	Rich	15	0.1

Location of coupon—	Corrosion in m.p.y. No vanadate	0.05% vanadate	
Filter—Rich	0.013	0.0016	
Filter—Lean	0.024	0.0017	104 days
	62 days		

Location of Pipe nipple—	Corrosion in m.p.y. No vanadate	0.05% vanadate
Lean solution	93.5	2.2
Rich solution	98.8	3.1

Recommended concentration. The recommended inhibitor concentration is 0.05 wt. %. The addition, at startup, of from 2 to 2½ times the calculated amount of vanadate will insure the formation of protective coating and provide for the recommended concentration. The initial consumption of vanadate is presumed to be the result of the deposit of a protective coating on the piping, and once the original coating is formed, further consumption is quite small. Excess use of this material can cause no damage to the system, and no decomposition has been noted in systems that have been in service over 1 year.

Cost. Sufficient vanadate to form the protective coating and maintain the required residual concentration can be added to a system for a very low cost. For example, only 30 lb. is required for a 6,500-gal. system to provide the recommended concentration of 0.05%.

Determination of vanadium content. A simple plant laboratory method for determining vanadium concentration in amine solutions can be obtained from Vanadium Corp. of America, 420 Lexington Avenue, New York. This test should be run periodically, and small additions of sodium metavanadate made as required.

Handling. Sodium metavanadate dissolved readily in hot water and can be added in this fashion to the gas-scrubbing system. Normal precautions to avoid inhaling excessive sodium metavanadate dust should be observed for the comfort of the worker.

In systems where hydrogen sulfide is present, vanadium sulfide may precipitate, but this does not impede the corrosion inhibition by the sodium metavanadate or the efficiency of the amine problem. However, the amine solution should be circulated after addition to vanadate and before contact with hydrogen sulfide.

Coming Soon:

How Refiners Control Air Pollution

THE FEBRUARY 20 ISSUE of the Journal will feature a special report on the current status of air pollution control and what the industry plans for the future.

This important report is based on a new and exclusive survey of refiners throughout the nation. It will include:

- Types of pollutants being attacked.
- Cost and results of programs in recent years.
- Control facilities planned for 1961.
- Past and future expenditures for research.
- Analysis of record-keeping systems on sources of pollution and complaints from residents.

Watch for this exclusive Journal report in the February 20 issue.

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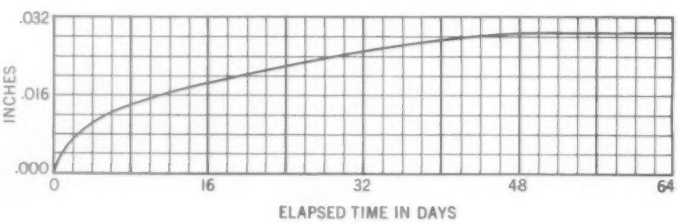
NEWS FROM DOWN THE LINE!

Are all pipeline insulators as alike as two peas in a pod?

They're not alike, not in physical properties! When plastic insulators first became available for pipeline use, WmSON felt they were inferior to the steel and block types then available. We delayed our entry into the field until we could provide a plastic material to withstand field abuse and wear. We found that material in a high density polyethylene which could be injection molded to provide low cost insulators of the highest quality.

Our decision has proved sound. Breakage and excessive wear of glass fibre reinforced plastics, particularly in large sizes, has created a lack of confidence in plastics in general, but the M-2 Plastic THINsulator® has proved its stamina. Its high resistance to cold flow has been proved. Deflection test results: 1000 p.s.i. on each THINsulator runner for 64 days — total cumulative deflection only 0.029". Max. temp. during test, 105° F., min. temp., 75° F.



Its low coefficient of friction causes it to slide easily inside casing. The M-2 is completely resistant to impact fracture (4.0 ft. lbs./in. notched) and has successfully worked on 36" pipe, ½" wall, pulled in excess of 500 feet. We are convinced that it will perform as well or better than any other insulator on the market, including all known steel types. Other physical properties: *Dielectric strength* — (short time, ⅛" thickness) 500 volts per .001 inches (D149-55T); *Tensile strength* — 4400 p.s.i. at 20 in./min.; *Elongation* — 25% 20 in./min.; *Abrasion resistance* — Taber index 5.7.

The increased acceptance of the M-2 THINsulator has brought production to a level of real economy in injection molding. These cost savings are being reflected in new WmSON prices for 1961.

In planning '61 cased crossings, don't pay a premium for other insulators — use WmSON engineered M-2's and save!

T.D. Williamson, Inc.

P. O. BOX 40 • TULSA 2, OKLAHOMA

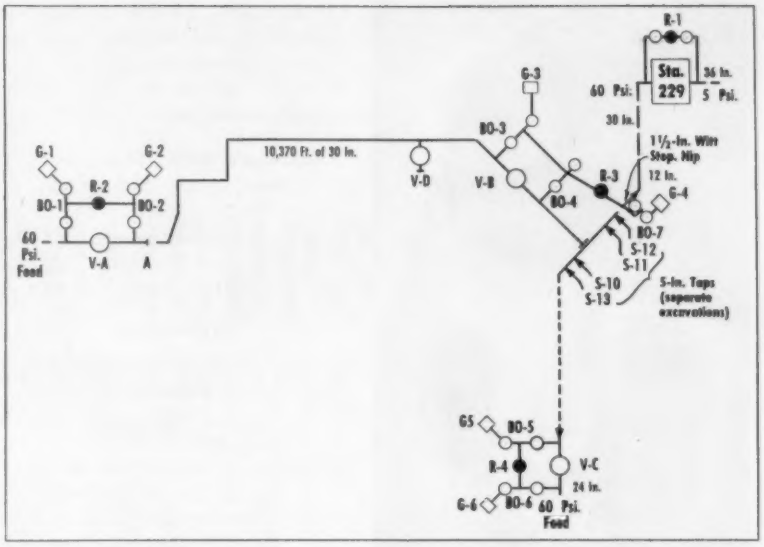
REPRESENTATIVES AROUND THE WORLD

Chance plays no part in hot tie-in

NOTHING is left to chance when Northern Illinois Gas Co. makes a hot tie-in. Not only is the entire operation mapped out by steps in chronological order ahead of time but all special tools, materials, and equipment that will be needed are listed and the whole program is triple-checked.

After the program, or operating routine, is laid out in detail by the field engineer, it is checked by a second person and approved by a third. Thus three persons share the responsibility for the proper preparation for the job. This is done well in advance of the actual operation.

Northern Illinois recently installed a hot tie-in when it joined the 30-in. Troy Grove pipeline to its system at Brookfield, Ill. It prefers the hot tie-in, with the gas in the line burning, to the cold tie-in to avoid the danger of explosion inherent in the accumulation of air-gas mixtures.



REFERENCE MAP shows location of all instruments involved in hot tie-in is prepared in advance of operation. Fig. 1.

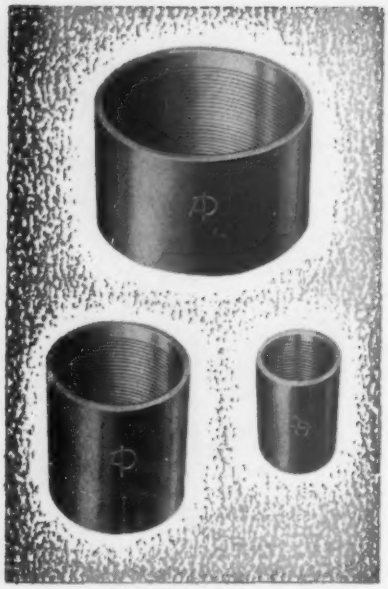
Operating routine. The operating routine was prepared for the job by Bruce W. Gilbert, field engineer. It covers only Part A—the 30-in. tie-in—of a two-part job. Part B covered a simple connection with an 8-in. line using an installed valve.

The operating routine for Part A begins with the work-order number, file number and date, and lists these special tools, materials, and equipment:

Two 30-in. night caps; four 30-in. diaphragm stoppers; three water gages; two 0 to 100-lb. gages; three

TEE is lowered into place to tie in 30-in. pipelines. Fig. 2.

WELDERS COMPLETE TIE-IN as gas in line burns to avoid accumulation of explosive mixtures. Fig. 3.



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Harrisburg Seamless Steel Pipe Couplings are manufactured to A.P.I. and A.I.S.I. specifications for petroleum and other industries. The Harrisburg developed process assures uniformity of threading unsurpassed in accuracy of form, height, angle and lead. Order the best — order Harrisburg couplings.

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CYLINDERS

FLANGES

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TRANSPORTS

LP regulators, Model 30; five 5-in. steel plugs; one mercury gage; two 30-in. bag stoppers; glass fiber tape; 49 M.c.f. carbon dioxide; asbestos cement, water, etc.

Reference map. There were 18 preliminary steps and 56 in the routine itself, a total of 74. In addition, a map is drawn to show the location of all pertinent facilities (Fig. 1). Here is lineup for Part A:

Preliminary:

A. Seven days before Part "A":
   1. Notify engineer of tests.
   2. Notify zone superintendent of supply.

B. Two days before Part A:
   1. Notify gas dispatcher.
   2. Observing pressures on 5-psi. system (30-minute test, 5.0-psi. minimum), close inlet valves at Station 229. By supply department.
   3. Install gage G-6 (0-100 psi.).
   4. Observing G-6, close valve V-C.
   5. Remove G-6.
   6. Notify gas dispatcher that valve V-C is closed.
   7. At Station 229, open inlet valve (S), bleeding line down to pressure of the 5-psi. system. By supply department.
   8. At Station 229, close inlet valve (S). By supply department.
   9. At Station 229, blow the inlet pressure down to 0.2-in. water column (W.C.).
   10. At Station 229, install regulator bypass R-1, to feed 0.2-in. W.C. back toward valve V-C.
   11. Close valve V-A.
   12. Open BO-2, blowing down end at "A."
   13. If V-A leaks noticeably, plan 5-in. tap for low-pressure stopper east of "A."
   14. Close BO-2.

C. One day before part "A":
   1. Make 5-in. taps for diaphragm stoppers at S-10, S-12, S-11, and S-13. (Also east of "A," if necessary, see step B-13.) By supply department.
   2. Check new valve V-B to be operative.

Routine, part "A":

1. Open valve V-B and remove cap at "B," if any.
2. Close valve V-D and install blind flange (or "frying pan").
3. Remove cap from new main at "A," if any.
4. Install, purge, and liven regulator bypass (R-2) from BO-1 to BO-2. (To feed 0.2-in. W.C.)
5. Install gages G-1 (0-100-psi.) and G-2 (water).
6. A. Controlling flame with R-2, light flare at BO-2.
   B. Install bond wire between new and old main at "A."
7. A. Cut off old end at "A," mudding cut.
   B. Close off R-2 and extinguish flames.
8. Removing end, install night cap at "A."
9. Checking lineup at "A," trim as required. Note: If V-A is leaking noticeably, install low-pressure stopper east of "A." It should be removed just before step 11.
10. At "A," remove night cap, then clamp and tape tie-in.
11. Inject CO_2 through BO-2, purging to "B."
12. Close V-B and install night cap (S) at "B."
13. Open BO-3.
14. Replace water gage at G-2 with a mercury gage.
15. Observing G-1 and G-2, crack V-A, purging to BO-3.
16. Close V-A and BO-3.
17. Replace mercury gage at G-2 with a water gage.
18. Controlling flame with R-2, light flare at BO-2.
19. Make weld (S) at "A."
20. Remove regulator bypass R-2 and close BO-2.
21. Remove G-2.
22. Observing G-1 (min. 40-psi.) crack valve V-A, pressurizing to V-B.
23. Open V-A.
24. Install regulator bypass R-3 from BO-3 to BO-7 (to feed 0.2-in. W.C.) and gage G-4 (inches at water).
25. Remove regulator bypass R-1 at Station 229.
26. A. Controlling flame with R-3, light flare at BO-7.
    B. Install bond wires between proposed ends at "B."
27. Make cuts at "B," mudding

cuts. (Leave piece in place.)
28. Close off R-3, extinguish flames, then turn on R-3 to feed 0.2-in. W.C.
29. Install regulator bypass R-4 from BO-6 to BO-5. (To feed 0.2-in. W.C.)
30. Install gages G-5 (inches of water) and G-6 (0-100-psi.).
31. Install low-pressure (LP) stopper S-10.
32. Install LP stopper S-11.
33. Install LP stopper S-12 (bag, bag north).
34. Install LP stopper S-13 (bag, bag south).
35. Remove the severed piece at "B."
36. Install night caps at "B."
37. Checking lineup at "B," trim as required.
38. At "B," remove night caps, then clamp and tape tie-in.
39. Inject CO_2 at BO-4, purging behind S-10 and S-11.
40. Remove S-10 and S-11, continuing the purge to behind S-12 and S-13.
41. Through bypass from BO-3 to BO-4, purge to behind S-12 and S-13.
42. Remove S-12 and S-13.
43. Remove regulator bypass R-4 (between BO-6 and BO-5).
44. Remove gage G-5.
45. Controlling flame with R-3, light flare at BO-7.
46. Removing tape just ahead of welders, make welds at "B." (Including 4-5-in. steel plugs.)
47. Remove G-4 and regulator bypass R-3.
48. Observing G-6 (min. 40-psi.) crack valve V-C, pressurizing to V-B and Station 229.
49. Open V-C.
50. A. Remove G-6.
    B. Set outlet pressure from Station 630 the same as outlet pressure from Station 227.
51. Watching G-3, open valve V-B.
52. Remove G-3.
53. Notify zone superintendent of supply that the 60-psi. feed to Station 229 has been resumed.
54. Open inlet valves at Station 229 to resume feed to 5-psi. system. By supply department.
55. Notify gas dispatcher of completion of routine.

PUMCUPS

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3 TO 1

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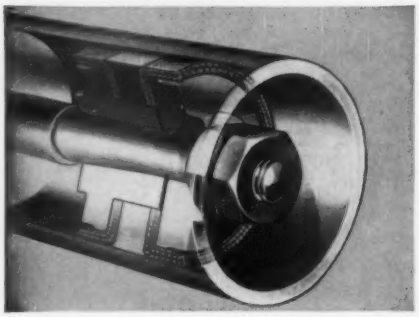

With Darcova Pumcups...regardless of wear, pressure keeps Pumcups hugging cylinder wall.

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- **Fluid slippage is virtually eliminated, because Pumcups operate at full efficiency throughout their entire life**
- **Maintenance costs are reduced, because you have fewer replacements, less downtime.**

Available in three textures—hard, medium and soft. Also in regular or 100% nylon composition. Size ranges from ¾" to 20". For *all* the facts on Darcova Pumcups, write for Bulletin 5903.

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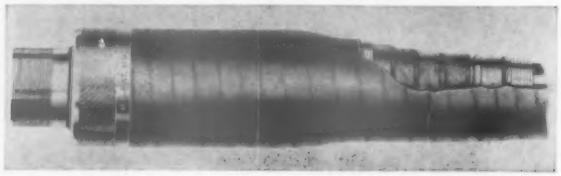
▶▶▶ New Equipment Section

This week's SHOWCASE features . . .

Latest rotary drilling hose

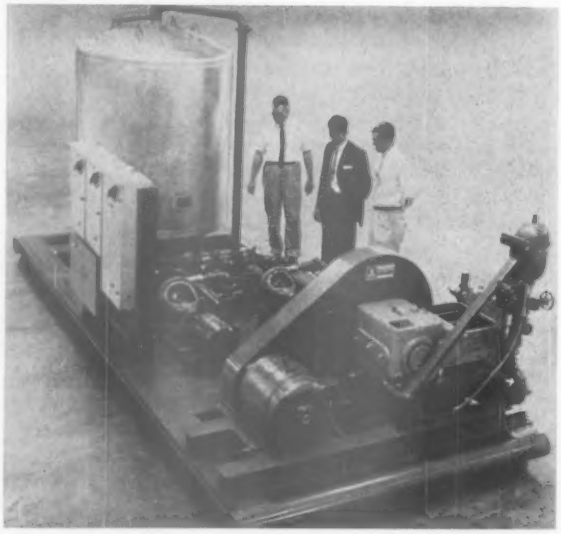


. . . to be put on the market is claimed to be considerably higher in quality than the standards set by API. The S-B-C Crown hose is constructed with four spirally wound plies of heavy steel wire to withstand high pressures met in drilling.

The mud-suction hose is said to be flexible enough to permit fast intake adjustment with connection change. It has built-in steel nipples.

The vibrator hose is constructed with built-in couplings. Source: **Skinner Bros. Co., Inc., Drawer 628, Tulsa 1, Okla., U.S.A.**

New portable water-flood unit



. . . designed for pilot-flood operation includes an injection pump and driver, circulating and backwash pumps, water filter, and control equipment all mounted on a steel skid. The skid is designed to provide maximum walk-around space for access during operation and for ease of maintenance.

Centrally located controls for automatic operation are included. Installation at the lease requires only the necessary electrical and water connections with the lease lines and power supply.

Components of the unit shown include a 3-in.-stroke, horizontal, triplex plunger pump driven by a 40-hp., three-phase, 220/240-volt motor, 5 by 5 ft. mechanical graded-bed-type water filter, O-ring-valve filter manifold with actuator, pump unit consisting of a 1½-in. centrifugal pump, 5-hp.,three-phase, 220/440-volt motor, backwash pump unit composed of a 2-in. centrifugal pump, 5-hp., three-phase 220/440-volt motor, and other electrical control instrumentation for automatic operation. Capacity of the unit shown is 2,000 bbl. per day at up to 940-psi. discharge pressure. Units are available to meet a variety of needs. Source: **Jones & Laughlin Supply Div., Drawer 2481, Tulsa 2, Okla., U.S.A.**

●

Aid to well cementing

. . . is a line of circulating cementing equipment which is claimed to make possible a nonstop casing run without pressure surges but still permit full downward circulation when necessary. The equipment has no depth limitations.

The cementing equipment was

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Described in OIL AND GAS JOURNAL - Issue of **February 6, 1961**

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Arkansas Drilling Costs Cut With ATLAS EMULSIFIER

$6,843 Saved in 3900′ Comparison

Following the operator's success in drilling with Atlas Emulsifier in Mississippi, Arkansas Fuel Oil Corporation and Montgomery Drilling Company pioneered the use of these drilling fluids in Columbia County, Arkansas. A direct comparison of their recently drilled Deltic Farms and Timber Company No. 1 with Arkansas Fuel's nearby Murphy No. 1 demonstrates the economy of utilizing Atlas oil-in-water emulsion muds. Murphy No. 1 was drilled a year earlier with a gel mud program typical of the Columbia County area. Even with the disadvantage of smaller equipment, the comparison interval was drilled in seven fewer days. Also, nine less bits were used to drill equivalent footage. Taking a rig cost of $900 per day and bit costs of $235 each, the savings total $8,415. Adjusting for the difference in mud bills (including diesel oil in the emulsion) the well shows a net saving of $6,843. Fewer days on the well often cut costs other than those noted above. In the case of Deltic Farms and Timber Company No. 1, 5½ fewer days to go from 6,200′ to TD made possible the earlier release of a logging unit and an additional saving of $165 a day.

DRILLING RECORD COMPARISON

	Deltic Farms & Timber Co. No. 1	Murphy No. 1
Mud	Trimulso Emulsion	Gel Mud
Interval	4812 - 8780	4971 - 8761
Feet Drilled	3968	3790
Drilling Days	24	31
Feet per Day	165	122
Drill Pipe	4″	4½″
Drill Collars	15	15
Pumps	1 - 6½ x 16	1 - 6 x 20
Bits	31	40
Feet per Bit	125	95
Weight on Bit	30 - 35,000	35,000
Liner Sizes	6½″	6″
Mud Cost	$5,520	$5,398
Oil Cost	$1,450	0

$6,843 saved

Atlas emulsifier is sold through distributors under these tradenames . . . each is the product of Aquaness Department, Atlas Powder Company:

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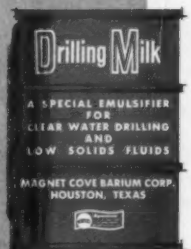

Drilling Milk
A SPECIAL EMULSIFIER FOR CLEAR WATER DRILLING AND LOW SOLIDS FLUIDS
MAGNET COVE BARIUM CORP. HOUSTON, TEXAS

ATLOSOL

Distributed by Milwhite Mud Sales Company and other selected mud companies

Registered trademark Atlas Powder Company

ATLAS EMULSIFIERS IMPROVE A GOOD DRILLING FLUID

Because Atlas oil-in-water emulsion muds provide better oil action, they improve hole conditions, extend bit life, and increase penetration rates.

Better Hole Conditions. Atlas oil emulsion decreases torque as much as 50% . . . the hole is kept cleaner and pump pressures are correspondingly lower. There is less danger in lost-circulation and low-pressure zones.

Longer Bit Life. Atlas oil emulsion prevents balling, provides better cutter and bearing lubrication. Greatly extended bit life reduces bit costs, reduces rig hours lost to trip time.

Faster Drilling Rates. Atlas oil emulsion makes more feet of hole per hour. Oil lubrication combines with improved hole condition to increase drilling rates in competent and troublesome formations.

ATLAS Aquaness CHEMICALS ATLAS POWDER COMPANY

Aquaness Department, Atlas Powder Company
P. O. Box 21072 • Houston 26, Texas

127

designed specifically for automatically filling the casing from the bottom while casing is being run, and to allow downward circulation through the casing at any time during the casing run.

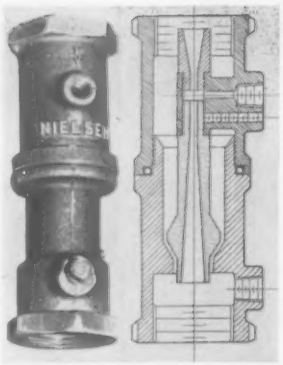
A resilient diaphragm valve permits a continuous but restricted bottom fill sufficient for adequate casing fill without overflow. A flapper type of valve is maintained in the open position by an aluminum retaining bar held in place with a shear screw.

The flapper valve is released by dropping a ball which shears the screw as it passes through the valve mechanism. The flapper valve is spring-loaded to provide a positive backpressure seal. Source: **Larkin Packer Co., Waxahachie, Tex., U.S.A.**

●

Continuous-flow air charger

. . . offers a way to introduce desired volumes of air or other gases into pressure systems. It operates through a vacuum generated by venturi action. According to the maker, the device provides a continuous metering of air or other gases into a pipeline carrying liquid under pressure.



Capacities range from 6 to 100 g.p.m. at pump pressures from 25 to 90 psi. Source: **Nielsen Mfg. Co., P. O. Box 5083, Eastmont Station, Oakland, Calif., U.S.A.**

●

Parabolic antennas

. . . protected from the buffeting of severe winter weather with an antenna cover which has been brought out. The cone-shaped fiberglas Para-Dome cover has been designed to withstand a wind force of 50 lb. per sq. ft., the maker says, and tests show signal attentuation between 2,000 and 6,200 mc. is within 0.1 decibel.

The protector comes in sizes for use with 4, 6, 8, and 10-ft. reflectors. Source: **Tower Construction Co., 2700 Hawkeye Dr., Sioux City, Iowa, U.S.A.**

●

Polypropylene pipe fittings

. . . can be obtained in 2 and 4-in. pipe sizes, and in Schedule 40 and 80 wall thickness. Anticipated uses in the petroleum industry include low-pressure, ambient-temperature applications such as oil and gas-gathering lines and salt-water-disposal systems.

According to the maker, the polyporpylene polymers appear to be considerably more rugged than more familiar polyolefins. However, present uses of the polypropylene do not

TANK CLEANER is made by Para-Lax Corp., Tulsa, Okla., who also make Para-Lax paraffin solvent.
Unit comprises a Robbins & Myers Moyno pump and a 30-hp Wisconsin Engine tailored for the job.
portable
WISCONSIN-
powered unit

cleans tanks *on-stream*... and recovers good oil from settlings

This unique pumping unit does both jobs at the same time — and without shut-downs. Its easy mobility adds more savings.

The rig pumps a special solvent to the bottom of the tank for dissolving paraffin and other settlings. A jet-action rake speeds the process by providing wide-area contact—and by pumping up to 250 bph of solvent at 150 psi for proper agitation to make the viscous bottoms pumpable.

The "cut" fluid is circulated and heated, if necessary, until all the good oil has been recovered. The pump also removes nails, nuts, bolts, and other matter.

Safe all-weather power is supplied by an air-cooled VH4D Wisconsin, complete with explosion-proof ignition and muffler. Its high torque prevents stalling under changing loads. And Stellite exhaust valves and inserts plus positive rotators *extend valve life up to 500%!*

Let us tailor the Wisconsin-powered utility unit for your job. Engine sizes from 3 to 56 hp — available with custom-engineered modifications. Write for more information.

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MOTOR CORPORATION
Milwaukee 46, Wis.

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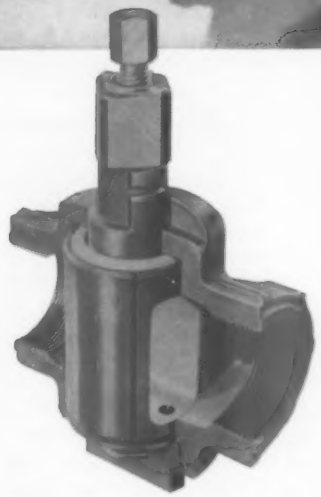
Oil Field Distributors for Wisconsin Engines and all types of Utility Units

World's Largest Builders of Heavy-Duty Air-Cooled Engines

J-268



Cylindrical plug prevents wedging in W-K-M's ACF® Lubricated Plug Valve

With *no* taper, the W-K-M plug can't wedge, can't unseat. *This cylindrical plug can only rotate* — like a journal in a well-lubricated bearing. Result? Even with abrasive ladings the valve remains continuously lubricated and free-turning . . . sealed by a film of grease around the plug and a ring of Teflon at the head.

Wherever service is demanding, or interruptions are costly, specify the valves that *can't wedge* — ACF Lubricated Plug Valves.

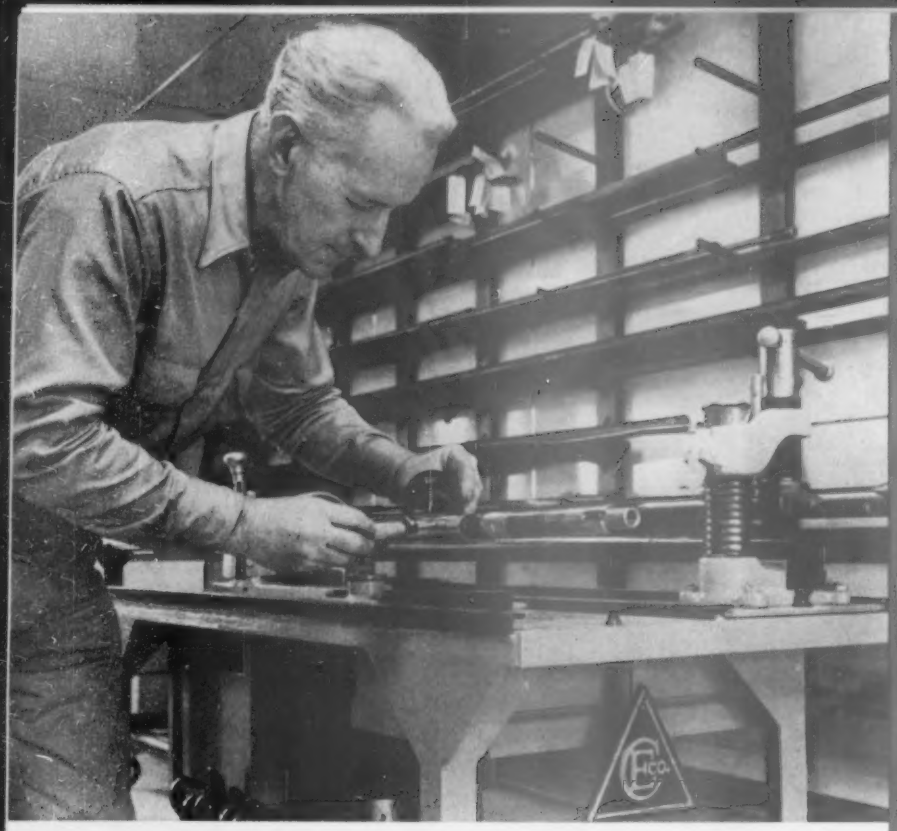
WRITE FOR CATALOG 400

Available in either full port or reduced port; rectangular, round, diamond and V-ports; also venturi, multiport and steam-jacketed models.
Materials: semi-steel, Ni-resist, bronze, aluminum
Sizes: ½" through 30"
Pressures: 125 through 800 psi.

W-K-M

DIVISION OF ACF INDUSTRIES
INCORPORATED
P. O. BOX 2117, HOUSTON, TEXAS

6007



Continental-Emsco's PRECISION HERE

.. keeps wells pumping longer

Continental's D+B pump shops are manned by trained, field experienced specialists using modern equipment and methods. The result: *superior service.*

Precision micrometers, gauges and special test equipment are used to check OD of plungers .. ID of liners and tubes .. pressure-test pumps after assembly. Specially designed aligning mandrels and clamps are used to accurately assemble and repair sectional liner pumps and composite plungers. Special vises prevent distortion of tubes and plungers. The use of friction tongs eliminates pipe wrench marks .. open doors for corrosive fluids. Vacuum testers are used to test fluid seal of valves. Desanding equipment is used to remove frozen plungers and entire pumps from sanded joints often saving considerable money by salvaging parts. Cooking vats and steam cleaning equipment remove paraffin and other deposits and also eliminate corrosive effects of salt water during pump repair. Each shop has special equipment to handle the popular pumps of the area.

Continental's training program keeps personnel "up" on all types of pumps, improved methods of assembly and new materials. You always get a longer pumping run for your dollar at D+B pump shops.

CONTINENTAL-EMSCO D+B PUMP SHOPS

CANADA

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Calgary
Drayton Valley
Edmonton
Red Deer

SASKATCHEWAN
Estevan

VENEZUELA

Anaco
Las Morochas

UNITED STATES

ARKANSAS
El Dorado
Magnolia

CALIFORNIA
COASTAL REGION
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LOS ANGELES BASIN
Long Beach
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El Dorado
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extend beyond the temperature range of unplasticized polyvinyl chloride fittings, which handle temperatures up to 150° F.

Polypropylene pipe and fittings can be joined quickly and easily by heat sealing. The resulting bond is said to be stronger than the pipe. It can be pressured almost immediately after joining. Source: **Tube Turns Plastics, Inc., 2929 Magazine, Louisville 11, Ky., U.S.A.**

●

Safety for storage vessels

. . . as well as process vessels is offered by a new depressuring safety valve. The Model 4280 valve is designed to meet the requirements for depressuring as set forth in API tentative Standard RP-520.

Pressure in the vessel being protected energizes the disk type of valve. Product vapor pressure is applied to the upper portion of the disk through piping. Valve opening occurs when pressure above the disk is vented by fusible plugs, control instruments, or manual control. The valve can then be reclosed. Source: **Shand and Jurs Co., 2600 8th St., Berkeley 10, Calif., U.S.A.**

●

Diaphragm valve

. . . for 6,000-psi. working pressure has been developed which uses a hammer-union type of body to permit fast replacement of the inner valve assembly. Made in a 1 and 2-in. size, the Model DSG-240 valve features a topworks assembly equipped with a pressed-steel diaphragm case and nylon-impregnated Buna-N diaphragm.

A diaphragm-travel indicator lets field personnel easily check valve position. The valve comes in normally closed versions and more than 150 variations. Source: **Instruments, Inc., P. O. Box 556, Tulsa, Okla., U.S.A.**

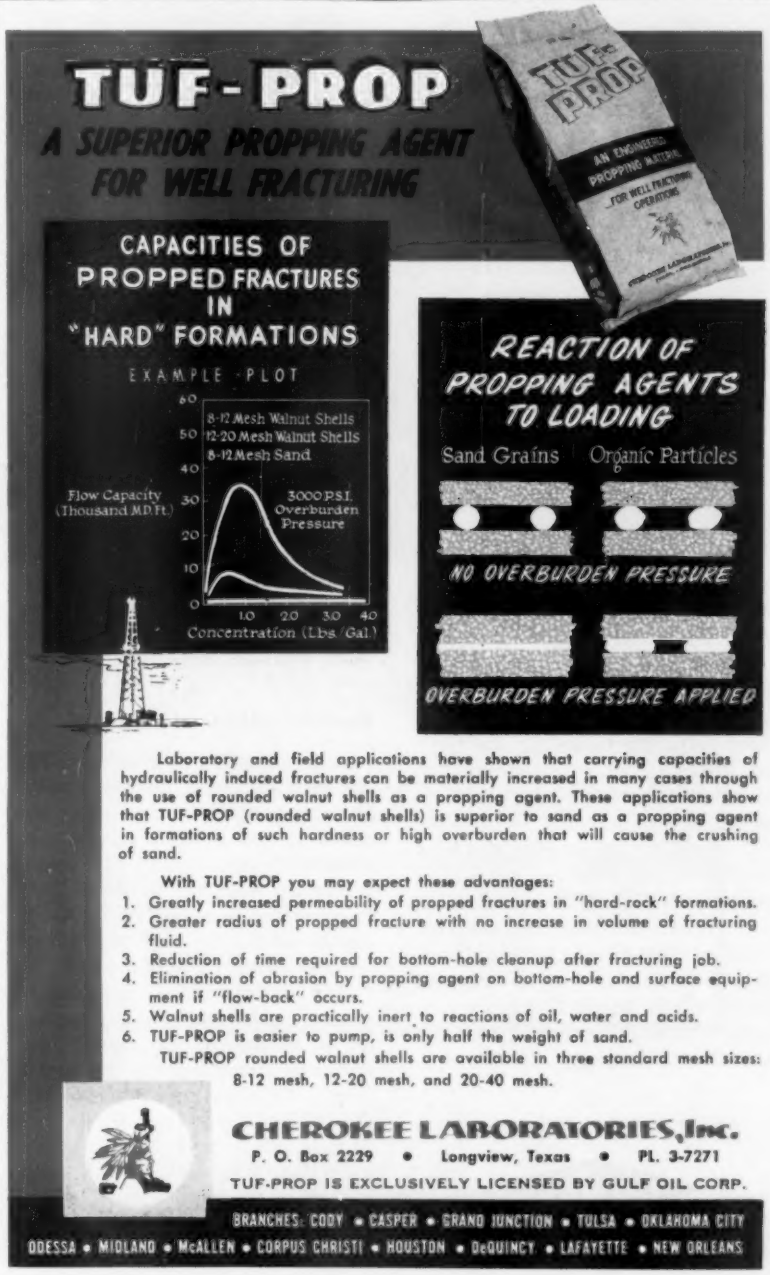
●

Winterized production unit

. . . now available for cold weather use comes in three models. One model features a separator submerged in the heater. Separator temperature is controlled directly by the heater. The maker claims this design assures a safe, static operating temperature.

In the second model, a steam generator furnishes heat through a coil to the liquid section of the separator and also serves as an indirect heater to warm all or any portion of the total incoming stream. According to the maker, gas temperature is maintained at the most efficient level by use of a temperature controller and a three-way blending valve.

The third model is a complete cold-weather heater, treater, and two-stage separator package. A fire-tube in the low-pressure separator-treater provides direct heat to the second stage and indirect heat to


TUF-PROP
A SUPERIOR PROPPING AGENT FOR WELL FRACTURING
TUF-PROP
AN ENGINEERED PROPPING MATERIAL FOR WELL FRACTURING OPERATIONS
CAPACITIES OF PROPPED FRACTURES IN "HARD" FORMATIONS
EXAMPLE PLOT
8-12 Mesh Walnut Shells
12-20 Mesh Walnut Shells
8-12 Mesh Sand
Flow Capacity (Thousand M.D.Ft.)
3000 P.S.I. Overburden Pressure
Concentration (Lbs./Gal.)
REACTION OF PROPPING AGENTS TO LOADING
Sand Grains
Organic Particles
NO OVERBURDEN PRESSURE
OVERBURDEN PRESSURE APPLIED
Laboratory and field applications have shown that carrying capacities of hydraulically induced fractures can be materially increased in many cases through the use of rounded walnut shells as a propping agent. These applications show that TUF-PROP (rounded walnut shells) is superior to sand as a propping agent in formations of such hardness or high overburden that will cause the crushing of sand.
With TUF-PROP you may expect these advantages:
1. Greatly increased permeability of propped fractures in "hard-rock" formations.
2. Greater radius of propped fracture with no increase in volume of fracturing fluid.
3. Reduction of time required for bottom-hole cleanup after fracturing job.
4. Elimination of abrasion by propping agent on bottom-hole and surface equipment if "flow-back" occurs.
5. Walnut shells are practically inert to reactions of oil, water and acids.
6. TUF-PROP is easier to pump, is only half the weight of sand.
TUF-PROP rounded walnut shells are available in three standard mesh sizes: 8-12 mesh, 12-20 mesh, and 20-40 mesh.
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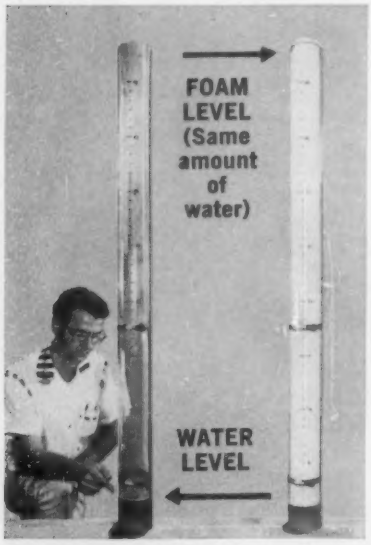
efficient foaming agents– to remove fluids from wells



Dowell foaming agents are designed to cause fluids to foam when aerated by gas or air.

When foaming occurs, fluid density is reduced and well unloading is simplified.

Foaming agents have been used successfully to unload gas wells and oil wells that produce some gas. Produced water or oil—as well as spent acid or fracturing fluids used for stimulation—have been unloaded. Usually, formation energy has been sufficient to unload the fluid. In instances where swabbing was required, swabbing time was reduced to a minimum.

Foaming agents have also been used to unload produced water from wells during air drilling operations.

Dowell foaming agents are offered in three types. G-2 is a water-soluble liquid; G-4 is an oil- and water-soluble liquid; G-5 is a water-soluble stick. All are available from any Dowell station.

PRODUCTS FOR THE OIL INDUSTRY

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

the inlet stream. The high-pressure separator is equipped with a special punched defoaming section which is said to give added gas scrubbing and better separation of high-pour-point liquids. The three units are tradenamed respectively, Bun - in - the - Oven, Tropi - Gas, and Tri - Treat. Source: **Maloney-Crawford Tank & Mfg. Co., Box 659, Tulsa 1, Okla., U.S.A.**

■

New advance in computers

. . . is a programing technique that automatically translates English-language instructions into computer code. Called Gecom, for general compiler, this new concept is said to permit a computer to accept many language - instruction techniques in use today. These include Cobol, common business-oriented language, a universal business language, and the scientific algebraic language known as Algol, algorithmic language.

Gecom is said to be useful in the solution of both business and scientific problems, instead of requiring the use of separate computer languages for different fields. Essentially, it is an automatic coding technique which accepts a combination of English words and phrases, automatically translates the English problem into machine directions, and defines the operations necessary for the computer to solve the problem. Source: **General Electric Co., Computer Department, Deer Valley Park, Phoenix, Ariz., U.S.A.**

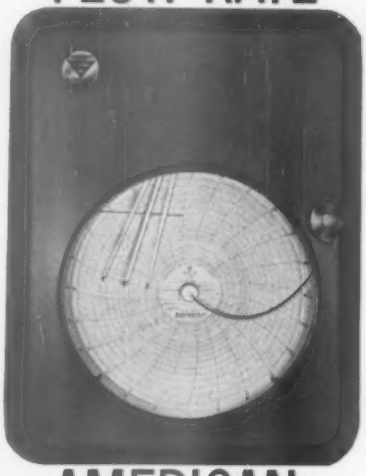
■

Buttress-thread casing

. . . in a new line is available. The casing is designed to meet the oil industry needs for casing and joints suited to the difficult service conditions of deep wells. The casing is said to meet the needs of wells being drilled in excess of 20,000-ft. depths where the pipe must stand tension loads of 110,000 psi.

The casing comes in standard sizes, weights, and grades. According to the maker, the casing gains its extra strength from the longer length of threads on the casing and the reduced flank angle of engaged threads. As a result the load is said to be distributed over the full cross-section of the pipe. Source: **Pittsburgh Steel Co., Grant Bldg., Pittsburgh 30, Pa., U.S.A.**

PRECISION MEASUREMENT AT ANY FLOW RATE



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A-88

ORIFICE METERS

Versatile American® Series A-88 mercury-type orifice meters meet the toughest flow measurement requirements – working pressures to 5,000 psi – interchangeable 10, 20, 50, 100 and 200-inch ranges. Recording meters may be equipped with 0-150° F. standard temperature element. Integrating meters integrate static and differential pressure, providing totalized flow indications. Telemetering equipped meters transmit integrated indications to remote locations.

- Manometer body easily cleaned – does not affect calibration.
- Tamper-proof calibration – simple, positive adjustment of float lever arm length.
- Interchangeable ranges – no manifold piping changes.
- Teflon-packed stuffing box is pressure tight, nearly frictionless, never needs lubrication.
- Teflon-packed pulsation dampener externally adjustable under full line pressure.
- Check valves give positive shut-off for over-range protection.

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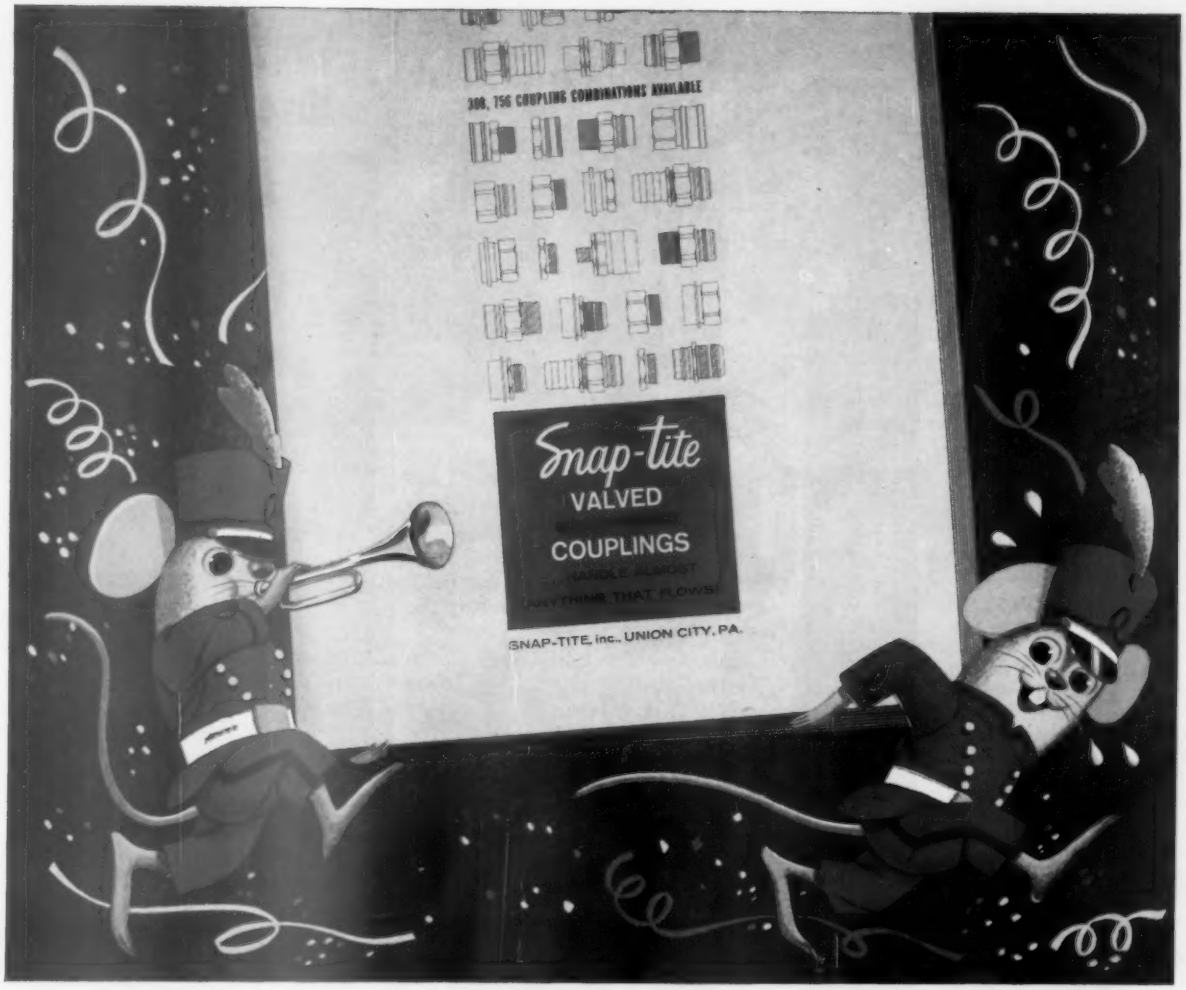
General Offices: Philadelphia 16, Pa.
Sales offices in principal cities



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Included are descriptive cutaway and exploded illustrations and complete weight and dimensional data for all sizes, ¼" to 6". Working pressures, flow, pressure drop and spillage data are also provided in detailed graphs and charts.

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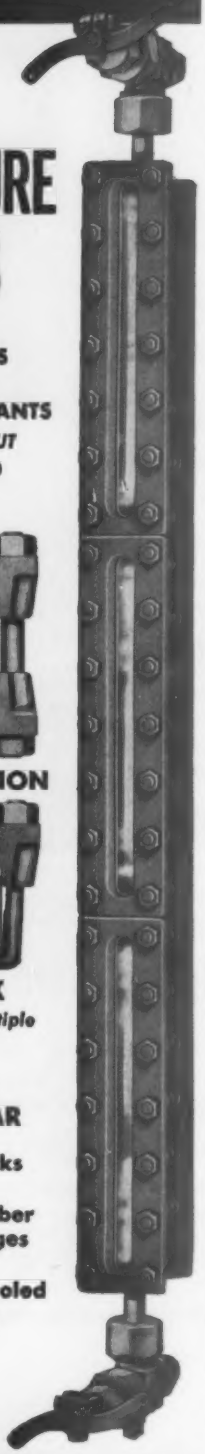

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COMPLETE CATALOGUE

STRAHMAN VALVES, Inc.
NICOLET AVE., FLORHAM PARK, N. J.

SHOWCASE . . .

New Equipment

Portable liquid loader . . . provides its own support and can be set up in a few minutes for use where a permanent installation is impractical. The Model K-59 loader is suited for use anywhere liquid products are handled in the field. It's adaptable to any terrain, the maker says.

Components include a 2-in. aluminum loading valve, 2-in. slide sleeve, 2-in. aluminum drop-tube swivel, spring balance unit, aluminum swivel joint, 2 by 3-in. aluminum coupler, and the loading stand. Source: **OPW Corp., 2735 Colerain Ave., Cincinnati 25, Ohio, U.S.A.**

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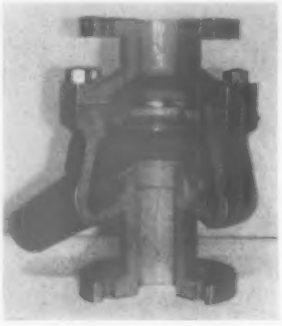
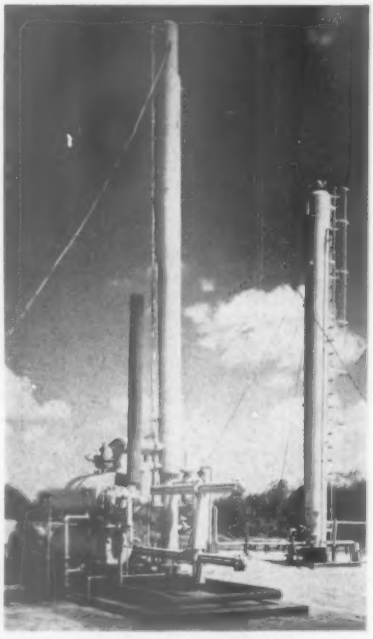


Separators for air, steam . . . available in England operate on the vortex principle to remove moisture and oil droplets, as well as contaminating particles from air and steam. As the gas or steam flows through the Supreme separator, it impinges upon a vane-plate, creating a vortex.

Models are available for pressures from 150 to 1,500 psi. and for vertical and horizontal installation. Pressure drop can be kept below 1%, the maker says. Separator efficiency rating is 99%. Source: **J. H. Carruthers & Co., Ltd., East Kilbride, Glasgow, England.**

Sweeten Sour Gas More Economically



with the NEW MALONEY-CRAWFORD SWEET-A-MINE

Maloney - Crawford technology makes low-cost, highly efficient amine desulferization a reality with the new Sweet-A-Mine. Whether you have 400 MCF/D or 50 MMCF/D of sour gas, a Sweet-A-Mine will give you specification gas . . . with virtually no field attendance.

The Sweet-A-Mine is in two assemblies—absorber and regenerator. The sour gases are absorbed in a solution of monoethanolamine and water, then the sour amine solution is regenerated for re-use. A special feature is a reflux condensing coil that boosts the efficiency of the regenerating process.

With these advances in mind, re-examine your sour gas problems. Tell us your conditions. M-C engineers have the answer. Contact them.

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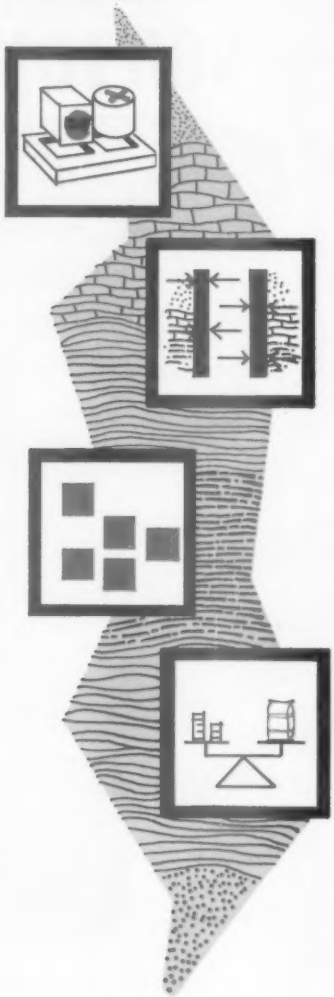
TANK & MANUFACTURING CO.
P. O. Box 659 Tulsa, Okla.

MUD WEIGHTING MATERIALS MAY LOOK ALIKE... BUT TESTS SHOW

BAROID* PERFORMS BETTER



All barium sulfate mud weighting materials look and weigh about the same, but they perform differently. Each mud company sets its own standards of quality. BAROID sets the highest standards.

These differences in standards can mean added expense to control the three basic properties of drilling mud: weight, filtration and flow properties.

One brand of weighting material may give your mud twice or three times as much gel strength, viscosity or filtrate loss as another brand. WHY TAKE CHANCES? *Use* BAROID, *the winner in performance!*

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6110

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for making hose connections at dockside, shipboard, storage depots, off-shore rigs, bunkering stations, and with road and rail tankers, etc.*

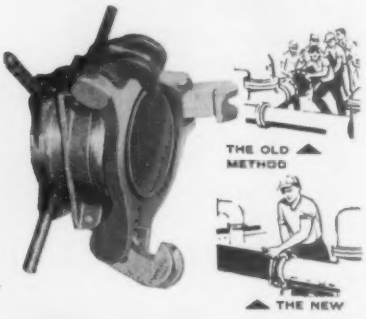
✓ **SAFE** Eliminates gaskets, drifts and wrenches and the dangers associated with their use.

✓ **EASY TO OPERATE** Just hook up and rotate the handle.

✓ **VERSATILE** Can be easily adjusted to accommodate the variations found in foreign counterparts of American flanges; can be attached to the hose either by screwing directly to the threaded nipple in the hose or by bolting to an existing hose flange.

✓ **POSITIVE SEALING** The seal is automatically made as the flanges are brought together and even on the roughest surfaces, the *higher* the pressure, the *tighter* the seal.

✓ **POSITIVE LOCKING** The coupling is locked whenever handle rotation is stopped.



**To check ALL the facts on construction and operation, request on your letterhead: "QD-16 Coupling Brochure"*

Flight Refueling, Inc.
COMMERCIAL PRODUCTS SECTION
BOX 1701 BALTIMORE 3, MARYLAND

Tool-dressing material

. . . a tungsten carbide type, can now be purchased by the pound in bars for application to milling tools, such as junk mills, rotary shoes, section mills, and similar tools. The material, tradenamed Servcoloy S, is applied by acetylene torch. It comes in bars measuring 18 in. long by about 1 in. wide. Complete instructions accompany each order. Source: **Servco, 2440 Cerritos Ave., Long Beach, Calif., U.S.A.**

●

Twelve-position automatic valve

. . . developed that can be used for automatic gas sampling and as an automatic sample feed to gas chromatographs or mass spectrographs. Twelve separate intake ports on the valve connect to a common vacuum chamber. Each valve is sealed by a spring-loaded ball valve, except at the time the port is open for sampling.

A three-second electrical pulse is necessary to move the valve from one position to another. The valve has 12 intake ports and one vacuum port. Each port is tapped for ⅛-in. pipe and comes with hose fittings installed. The sequential valve weighs 3 lb. and measures 5⅞ by 4⅛ by 4 in. Source: **Gelman Instrument Co., 106 N. Main, Chelsea, Mich, U.S.A.**

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ADDITIVE

Greater "Clinging" Power for Increased Thread Protection!

Jimmie Gray®
"500 TON"

Used on more wells throughout world-wide drilling industry!

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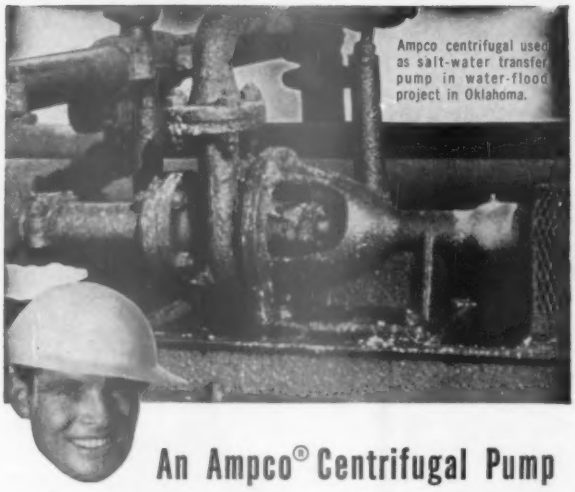

An Ampco® Centrifugal Pump

thrives on salt water!

Engineered to resist velocity, erosion and corrosion. Extra protective features—at no extra cost — reduce maintenance and downtime.

Available *from dealer's stock* in stainless steel, Ampco metal, and Illium "G" — and with elastomer or rubber linings. See your Ampco Pump Distributor.

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West Coast Div.: Huntington Park, Cal. • Southwest Div.: Garland (Dallas Co.), Tex.

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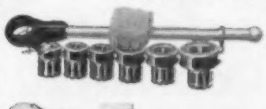


Exposed Ratchet Type

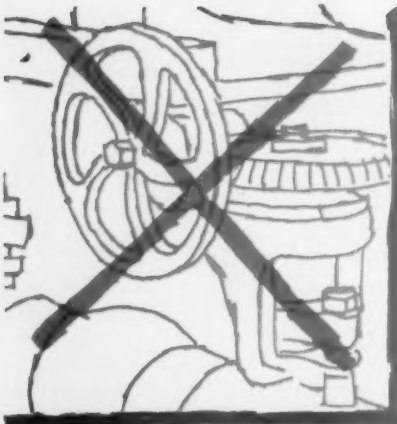
For pipe—⅛" to 1"—00-R
⅛" to 1¼"—111-R
⅛" to 2"—12-R
For bolts—¼" to 1"—00-RB

Enclosed Ratchet Type

For pipe—⅛" to 1"—0-R
⅛" to 1¼"—11-R

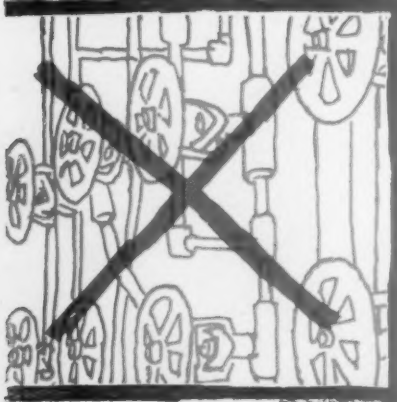
RIDGID®

The Ridge Tool Company • Elyria, Ohio, U.S.A.



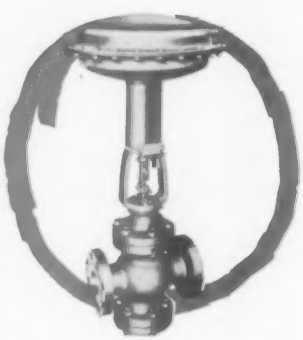
Only one way to go...

...That's to *automatic* valve operators. Manual valve operation is just too haphazard — not to mention expensive. And you can automate without a lot of costly down time, too. General Controls' famous



Tork-Master® electric gear-driven operators adapt to existing manual valves right in the field. Or, if you're considering replacement or new construction, it'll pay you to check into the Hydramotor®, Hammel-Dahl and Foster lines of electro-hydraulic, pneumatic and steam specialty valves. Anyway at all, you're

automatically thinking General Controls. Check the information request card for your copy of the new Industrial Controls Catalog — or call your local General Controls factory branch office for more information. Your move.



GENERAL CONTROLS

Automatic Controls for Product or Process

Glendale, Calif. · Skokie, Ill. · Guelph, Ontario, Canada

Nine Plants — 44 factory branch offices serving the United States, Canada and Western Europe

SHOWCASE . . .

New Literature

Tips on keeping boilers clean

. . . are offered in a new two-page literature piece just published. It notes that the best way is by keeping the burner clean, since a clean burner enables fuel to burn efficiently and keeps carbon from forming on the furnace walls and tubes. If the boiler has a rotary cup burner, it will operate better if it receives daily cleaning and wiping. The literature reports that less cleaning and attention is required when the boiler has a low-pressure, air-atomizing burner. This enables heavy oils to be broken up into a fine mist and assures complete combustion without carbon formation. Source: **Cleaver-Brooks Co., 326 E. Keefe Ave., Milwaukee 12, Wis., U.S.A.**

Gear and bearing lubricants

. . . are outlined in an eight-page brochure describing the characteristics and performance of Almasol product developments. Almasol, a wear-reducing agent, is said to possess high load-carrying strength, low coefficient of friction, chemical inertness, and a natural affinity for metals. One section of the brochure outlines a specific program for evaluating gear lubricants. Source: **Lubrication Engineers, Inc., Box 7128, Fort Worth 11, Tex., U.S.A.**

Valve lubrication

. . . and servicing instructions are contained in eight-page Bulletin V-218, now available. It describes by text and step-by-step illustrations the proper methods of lubrication for lubricated plug valves, the correct adjustment of valves; how to repack Hypreseal valves with plastic stem packing, etc. The bulletin includes a chart of recommended lubricants, along with photos and description of lubricant-dispensing equipment. Source: **Meter & Valve Div., Rockwell Mfg. Co., 400 N. Lexington Ave., Pittsburgh 8, Pa., U.S.A.**

Coagulation chemicals

. . . for clear water are discussed in an eight-page publication now being offered free. Bulletin A-1 deals with the chemistry of coagulation applied to effective water treatment in industrial plants, practical approaches to problems, and solutions. Processes described include application of sodium aluminates; refined montmorillonites; cationic, anionic, and nonionic polymers; and a new concept of inline clarification. Source: **Nalco Chemical Co., 6216 W. 66th Pl., Chicago 38, Ill., U.S.A.**

New Dimensions in Power

. . . Bulletin GED - 5685 describes the Models 720 and 722 industrial gas turbines, along with a discussion of performance in such uses as power for emergency generator sets, gas-line pumping stations, and oil-well fracturing units. Included is a discussion of the turbines' potential as power sources for off-the-highway vehicles. The 16-page publication adds a review of engine specifications. Source: **General Electric Co., Schenectady 5, N.Y., U.S.A.**

Aliphatic amines

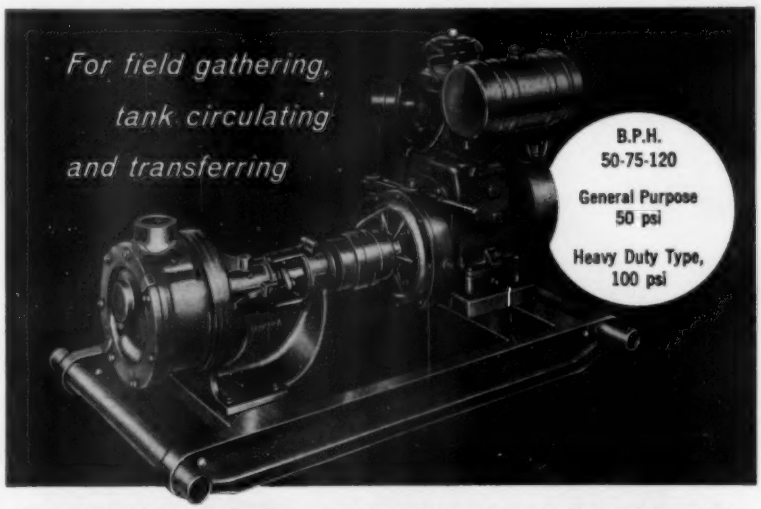
. . . booklet tells what they are and their capabilities. Tradenamed Armeens, these organic bases derived from fatty acids are said to be versatile surface-active agents with wide acceptance in the petroleum field. The 24-page booklet gives compositions as determined by gas chromatography and includes complete specifications, physical-properties reactions, and other data for primary, secondary, and tertiary amines along with specialty and polyethoxylated amines. Source: **Armour Industrial Chemical Co., 110 N. Wacker Drive, Chicago 6, Ill., U.S.A.**

Catalyst-protection facing

. . . for moving-bed-catalyst systems is discussed in a new four-page literature piece obtainable now. It lists five different specifications for catalyst-protection facings for use on various components and services. Source: **Texas Alloy Products Co., Inc., Box 19527, Houston 24, Tex., U.S.A.**

Temperature-conversion chart

. . . presently being offered, permits rapid, accurate conversion from Kelvin, Rankin, Centigrade, or Fahrenheit scales to other scales. The 8½ by 11-in. chart is printed



COMPACT-EASILY MOVED
VIKING CRUDE OIL PUMPS

With skid type steel bases, these Viking crude oil pumping units are easily moved from job to job. They completely fill the need for many field gathering, tank circulating and general transferring jobs.

Built to use gas engines, these units have optional reduction gearing and clutch equipment. If you're looking for versatile, work-horse units to pump crude oil, your search has ended. Here are your pumps!

For full information, write for bulletin SP-523T

50 YEARS

VIKING PUMP COMPANY

Cedar Falls, Iowa, U.S.A. • In Canada, It's "Roto-King" Pumps
Offices and Distributors in Principal Cities • See Your Classified Telephone Directory

SENSITIVE SENTINEL

is a good description of the Barton 257 differential pressure indicating switch. Accurate, responsive, easy to read and infinitely dependable, the 257 is ideal for energizing alarm circuits when limits of flow, level, or differential pressure are exceeded. Like many Barton instruments, the 257 D.P. switch has as its heart the rupture-proof dual bellows Barton meter body—proved beyond doubt to be the finest in the field. For new standards of accuracy and dependability in your measurement and control instruments, look to the leader—buy **BARTON**®

BARTON INSTRUMENT CORPORATION • MONTEREY PARK, CALIFORNIA

on both sides of a sturdy sheet and is punched for a three-ring binder. Range is from absolute zero to 16,000° C. Accuracy of rulings is about 0.01° below 100° C., 0.02° up to 300° C., 0.05° up to 800° C., 0.2° up to 2,000° C., 1° up to 6,000° C., and 5° up to 16,000° C. Source: **Rosemount Engineering Co., 4900 W. 78th St., Minneapolis 24, Minn., U.S.A.**

Two-way communications

. . . booklet (four pages) deals with the Outercom two-way radio, completely portable and interchangeable. The literature offers advantages, benefits, features, and photographs and applications. Source: **Outercom Electronics Co., Box 4060, Charlotte, N. C., U.S.A.**

Boiler

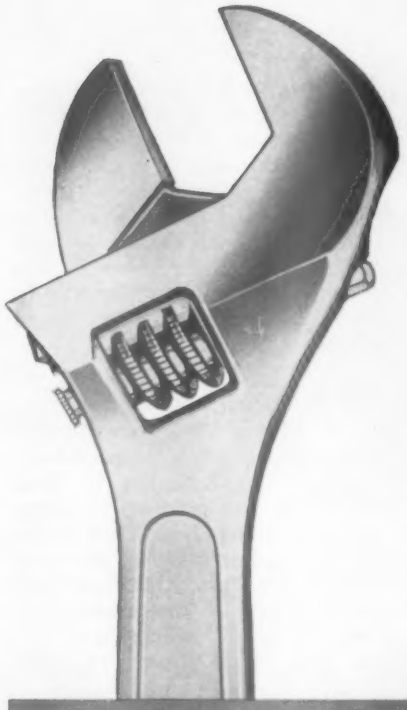
. . . and pressure-vessel-code wall chart illustrates various types of pressure-vessel construction provided for under Section 8 of the ASME code, and furnishes direct references to code rules that apply to these construction features. For example, circumferential joints are illustrated along with the suggestion to refer to code rules UW-34 and UW-35 for a full discussion of such joints. Source: **Missouri Boiler & Tank Co., 23rd and Papin Sts., St. Louis 3, Mo., U.S.A.**

Industrial silencers

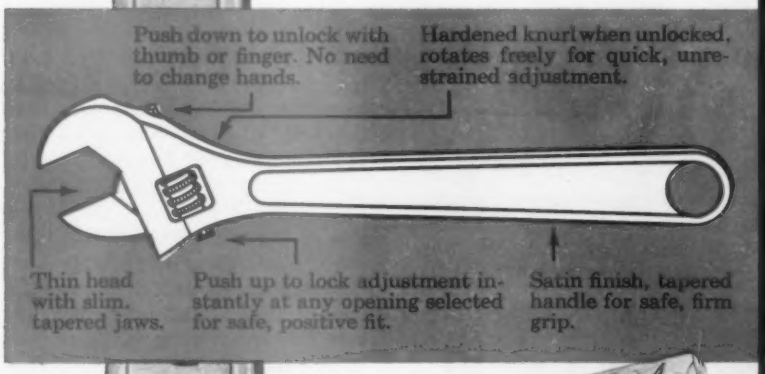
. . known as "Silentflow" are the topic of a new four-page publication. In the form of a condensed design manual, Bulletin B-13 deals with methods for handling the problem of noise generated by gas flow devices. It describes the acoustic and aerodynamic characteristics of various types of silencers, and gives design charts for proper selection. Source: **Silence, Inc., Box 21, Farmingdale, N. Y., U.S.A.**

Centrifugal-pump

. . . selection catalog presents charts showing the recommended temperature and pressures for 10 classifications of pumps ranging from − 350° to 1,000° F., and up to 1,000 psig. Twelve-page Circular 184 includes descriptions, illustrations, and specifications for each pump type. Source: **Dean Brothers Pumps Inc., 323 W. 10th St., Indianapolis 7, Ind., U.S.A.**

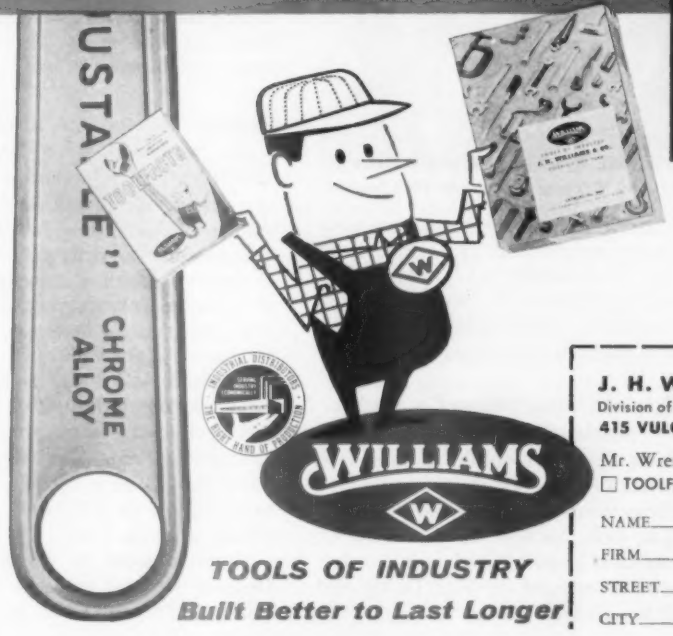


The original push button locking wrench by Williams ... tough enough to whip the meanest jobs, accurate enough for the finest adjustments


Push down to unlock with thumb or finger. No need to change hands.
Hardened knurl when unlocked, rotates freely for quick, unrestrained adjustment.
Thin head with slim, tapered jaws.
Push up to lock adjustment instantly at any opening selected for safe, positive fit.
Satin finish, tapered handle for safe, firm grip.

ONLY WILLIAMS HAS THIS EXCLUSIVE D-SLOT DESIGN

Williams' unique D-Slot design provides wide, square-shouldered tracks for full, positive bearing of the sliding jaw under any working stress. Slot is not subjected to spreading forces common to other adjustable wrenches. Performance is consistent parts replacement infrequent



MR. WRENCH SAYS: Send for New Catalog listing 4530 stock tools and forgings. Also available... New TOOLFACTS booklet on how to select, use and care for Quality Wrenches.

J. H. WILLIAMS & CO.
Division of United-Greenfield Corporation
415 VULCAN STREET, BUFFALO 7, N. Y.

Mr. Wrench: Please send me your new
☐ TOOLFACTS Booklet ☐ ILLUSTRATED CATALOG No. 304

NAME_____ TITLE_____
FIRM_____
STREET_____
CITY_____ ZONE_____ STATE_____

▶▶▶ Equipment Men Notes

F. W. (Bill) Ryser assumes post

F. W. Ryser

. . . as sales representative for oil and gas pipe for Southern Pipe Division of U. S. Industries, Inc. According to W. F. Dickinson, manager of oil and gas pipe sales for Southern Pipe, Ryser will headquarter in Fort Worth and will cover the Mid-Continent area. He previously worked for Bethlehem Steel Co.'s Supply Division.

Oil Well Supply appoints two

. . . representatives — J. W. Etheredge and William F. Scott, Jr.—in Hobbs, N. M. and Pittsburgh, respectively. Etheredge was employed by the division in 1955 at McCamey, Tex. He was shifted to Kermit, Tex. in 1955 and to Odessa last year.

Scott joined Oil Well in 1945 at Bolivar, N. Y. He was transferred to Bradford, Pa. in 1947, returning to Bolivar the following year as store manager. In 1949 he went back to Bradford, where he was store manager until his present appointment at Pittsburgh.

Clayton Mark & Co. promotes

. . . three executives in its sales and purchasing organizations, reports Clarence Mark, Jr., executive vice president. Roy W. Gronauer has been named manager of the pump and well-supplies sales division; William J. Dickman becomes manager of the union sales division; and Carl V. Schroeder takes over as director of purchasing of the Evanston, Ill. firm.

Five PESA members elected

. . . directors of the American Petroleum Institute from the organization's "supply group." Elected to serve as directors through 1961 are A. W. McKinney, National Supply Co.; W. H. Larkin, Larkin Packer Co.; and L. B. Meaders, Halliburton Co. Members elected to terms expiring in 1962 are Elliott A. Johnson, Schlumberger Well Surveying Corp., president of Petroleum Equipment Suppliers Association; and John G. Seiler, Tube Turns, PESA vice president.

Chicago Pneumatic Tool names

. . . nine sales executives to key management positions within the company's Oil Tool Division, according to Claude Griffin, sales manager.

Appointments involve Leonard H. Busby, assistant to the general manager, Oil Tool Division; Vernon Ash, Gulf Coast division manager; Glenn A. Bilbo, division special representative assisting Ash; Robert Rendall, district manager of the West Texas division; Thomas Tefertiller, assistant district manager at Oklahoma City; Joe Curtis, special representative with headquarters in New Orleans; Tim Allen, sales agent of the South Louisiana oil-tool division; Donald Anderson, district manager of the south Edmonton, Alta. area; and Vernon Linn, special representative working out of Calgary.

Dynel, Inc. is established

. . . in Los Angeles to manufacture specialty products in the electro-mechanical-instrumentation field, according to Ray V. Long, president. His vice president is H. Dickinson. Both men have extensive electro-mechanical experience from their associations with Vapor Recovery Systems Co., world-wide organization specializing in electronic and telemetering systems.

Ray V. Long

H. Dickinson

Daniel Orifice Fitting Co. names

. . . Berkley Engineering & Equipment Co., of Honolulu, as sales representative for Daniel products throughout the Hawaiian Islands. The firm, located on the island of Oahu, is headed by Merrill Berkley, who is assisted by Rex Dalby and Peter Hansen.

Keenan Pipe & Supply is named

. . . a distributor of valves made by Frank Wheatley Co., of Tulsa. Keenan will maintain complete stocks at its warehouses in Los Angeles, Bakersfield, and Tucson. The Wheatley line will also be available through Keenan branches in San Diego, San Bernardino, North Hollywood, Phoenix, Las Vegas, and Denver.

Oil Base, Inc. opens office

. . . in Corpus Christi for the sale and service of Black Magic oil-base-drilling fluid, according to Thad Randolph, vice president in charge of sales. Kemp Barley will be the district manager covering the lower part of the Texas Gulf Coast and South Texas. A storage and distribution terminal has been established at Alice, Tex., to serve the area.

Atlas Bradford is distributor

. . . of oil-country-tubular goods manufactured by Colorado Fuel & Iron Corp., Pueblo, Colo. Distribution will be through both Atlas Pipe Inc. and Bradford Supply Co., each a division of Atlas Bradford Co.

Atlas Pipe maintains shops and storage yards in Houston and Corpus Christi, where it is equipped for threading casing and tubing to API specifications. Bradford Supply has oil-field-supply stores in the oil-producing states east of the Mississippi River, as well as in Texas, Oklahoma, and Kansas.

Chiksan Co. appoints three veeps

. . . in the persons of Lee Guill, former eastern regional sales manager, now vice president and sales manager; Gus M. Bagnard, who will also continue as chief engineer; and E. Nelmes Thomas, vice president of Chiksan International who will also continue as manager of sales development for Chiksan.

Guill joined the company in 1949. Originally located at the Chicago office, he was promoted to eastern regional sales manager in 1959. In his new capacity he will headquarter in Chiksan's general offices in Brea, Calif.

Bagnard went to Chiksan from Douglas Aircraft in 1944 to establish the company's test facilities in

J-M packing for valves

J-M packing for pumps

...A SIMPLE RULE-OF-THUMB THAT LETS YOU REDUCE PACKINGS INVENTORY ...AND STILL HANDLE 9 OUT OF 10 VALVE AND PUMP PACKING JOBS!

FOR VALVES, J-M THERMO-CORE® (black) offers excellent heat resistance, maximum sealing under least compression, and adapts readily to equipment variations. For general use, Style No. 397 is recommended. This style consists of Inconel-reinforced asbestos yarns . . . braided over a soft center core of graphite and 100% white asbestos.

FOR PUMPS, J-M CHEMPAC® (white) combines the excellent sealing and heat-resistant qualities of asbestos with Teflon's immunity to almost all chemical and solvent action. Chempac Style No. 2009 is recommended to give you long, efficient and economical service on the majority of your pump, expansion joint and agitator applications.

For special conditions – or for any other mechanical packings application you can name–Johns-Manville produces the industry's most complete range of packing styles. These are described in J-M's new 64-page Mechanical Packings Book. It is designed to help you select the packing best suited to each particular requirement. For a free copy of PK-131A, write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, address Port Credit, Ontario. Cable address: Johnmanvil.

JOHNS-MANVILLE JM

Better Production Tools Through Research

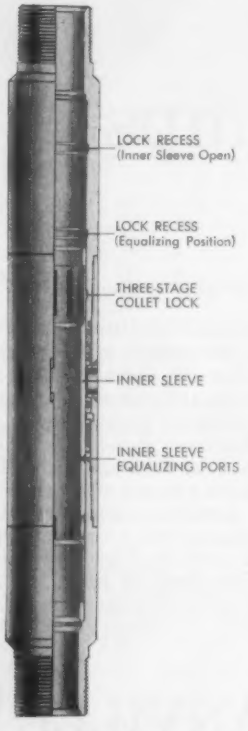
OTIS Equipment NEWS

Volume III, Number 1 **Otis Engineering Corporation • Dallas** *Production Equipment and Services*

Otis Sliding Side-Door Proves Most Versatile Circulating and Production Tool in the Field Today

Three Different Versions Solve Many Costly Production Problems

DALLAS — The Type A Otis Sliding Side-Door®, designed and introduced to the oil industry just four years ago, has become the most widely used selective circulating and production tool in the field today. Since its introduction, two modified versions — the Sliding Side-Door, with pump-out plugs and expendable shifting device, and the Sliding Side-Door Cross-Over — have been introduced.



TYPE A OTIS
SLIDING SIDE DOOR

© 1961 O.E.C.

The Type A Otis Sliding Side-Door is a full-opening tool designed to provide a selective means of establishing a flow course between the tubing and annulus without killing the well, moving the tubing, or disturbing the packer setting. The tool is opened or closed by standard wire line methods and so designed as to permit any number of Sliding Side-Doors to be installed in a single string of tubing and any one or all opened or closed with a single run of the rugged, proven shifting tool. The Sliding Side-Door with pressure shifting tool may be run in on the tubing in the opened position and after circulating may be closed by pumping down an aluminum ball or drop plug.

Proven Design Features

According to the many operators using this equipment, there is an exclusive combination of features that makes the Otis Sliding Side-Door preferable for efficient well completion and economical production. These are: (1) Thoroughly proven in thousands of wells. The design and mechanical operation of the tool has several years of operating proof behind it — the producer can use the Otis Sliding Side-Door with confidence. (2) Positive indication of opened-closed sleeve position. The shifting of the inner sleeve of the Sliding Side-Door is accomplished by the rugged Otis Shifting Tool. This proven Otis Shifting Tool is an automatic self-releasing device that serves to indicate positive opening or closure of the sleeve. The inner sleeve also incorporates equalizing ports that are designed to permit equalization of abnormal pressure differentials when shifting the sleeve. (3) Outer sleeve design and construction combined with the clearance between the inner and outer sleeves have practically eliminated the metal-to-metal bind that makes shifting other tools often impossible. The Type A Otis Sliding Side-Door is designed to withstand the distortion forces of temperature, compression, tension, or torque and still be shifted. (4) Flow area through the sleeves of the Otis Sliding Side-Door is of ample size to permit desired fluid passage.

Versions for Special Application

The Type A Otis Sliding Side-Door with pump-out plugs and an expendable pressure shifting device provides additional blowout protection and cuts completion costs. This version of the Otis Sliding Side-Door permits the tree to be nippled up and drillable packers to be tested before unloading the well.

Another version is the Otis Sliding Side-Door Cross-Over which is designed to provide complete zone isolation while changing or removing cross-over chokes in single-string, dual completions.

All three Otis Sliding Side-Doors are available in a wide range of sizes — and all three Sliding Side-Doors are good examples of the cooperation of Otis' Well Completion Specialists and Engineering Staff in assisting operators to meet today's demand for economical well completion and production tools. Literally thousands of production problems have been solved by Otis over the past thirty years. Perhaps you are faced with a production problem Otis could help solve. If so, call your local Otis specialist today. For more information on Otis Sliding Side-Door equipment, call the Otis office nearest you or write Otis, Dept. E-1, P. O. Box 35206, Dallas 35, Texas. You'll find experienced Otis Well Completion Specialists ready to help you . . . anxious to serve you . . . and with the widest variety of field proven production equipment and services available today.

OTIS
Engineering Corporation
General Offices
6012 Denton Drive • Dallas

Brea. He has been chief engineer for 8 years. Thomas, formerly with Commercial Solvents Corp. in New York, joined Chiksan in 1952 as manager of sales development.

William H. Clark is appointed

. . . district sales manager of Fibercast Co., Sand Springs, Okla. In charge of a district which comprises Indiana, Michigan, Illinois, Missouri, Iowa, Minnesota, Wisconsin, and the western half of Kentucky, he will locate in Madison, Wis.

Fibercast, manufacturer of reinforced epoxy-resin pipe and fittings, is operated by Continental-Emsco Co., of Dallas. Both companies are divisions of Youngstown Sheet & Tube Co.

D. K. Davis is general manager

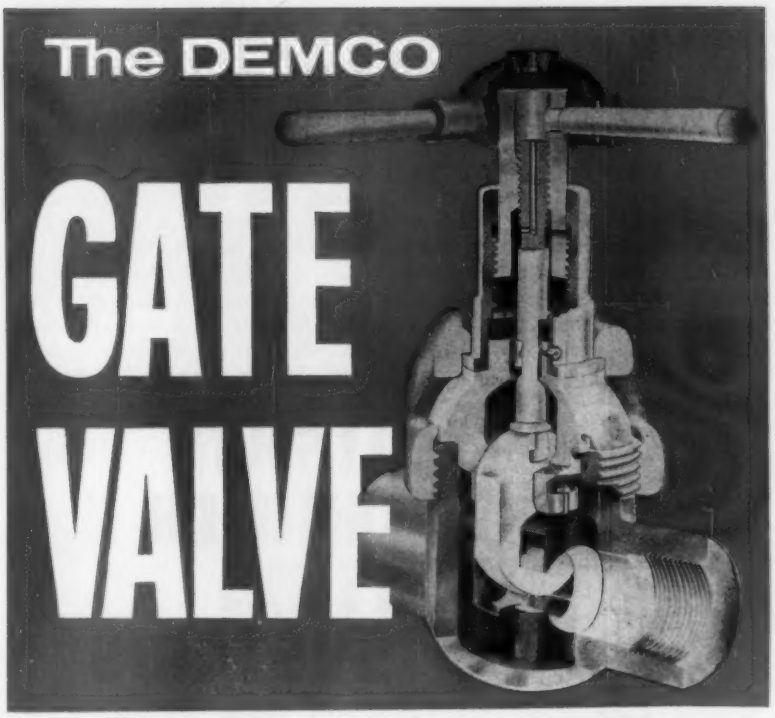
D. K. Davis

. . . of Midwestern Mfg. Co., according to Armon H. Bost, president of the Tulsa firm which manufactures hydraulic-powered sideboom equipment for use on pipelayers. Davis, formerly with Douglas Aircraft Co. for 11 years, will be in charge of all design and manufacturing work and will also handle sales-development work at Midwestern.

Bost also announced that his firm had purchased the materials, inventory, and patents of Sooner Boomer Mfg. Division of Oklahoma City. Hubert Gragg, former owner of Sooner Boomer, which has specialized in producing sidebooms for rubber-tired tractors for more than 4 years, will act as a dealer for both Sooner Boomer and Midwestern sidebooms.

Kinzbach Engineering is formed

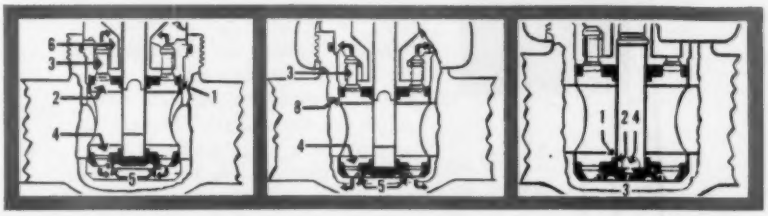
. . . in Houston to continue the development, manufacture, and marketing of Kinzbach relief valves used in the oil industry, announces R. B. Kinzbach, president of the new firm. These products, among those of Kinzbach Tool Co. sold to



Seals DROP-TIGHT without "bumping"

Positive sealing under the highest line pressures—*with minimum torque*—makes the Demco GATE VALVE your best buy for every mud line application . . . for water flooding, hydra-frac, acidizing and cementing service . . . and for many production applications.

Demco's secret lies in its unique one-unit seal assembly, with its patented spread-ring construction. Here's how it works . . .



A. Resilient seat assembly (1) is reinforced with steel wear rings (2), having integral projecting pins at top (3) and bottom (4). In normal contracted position, the seat assembly is easily inserted in, removed from the body. Until the seat assembly is bottomed, the steel spread ring (5) does not act upon the lower projecting pins, nor do the bonnet legs (6) act upon the upper pins.

B. With the bonnet down and the seat assembly bottomed, the spread ring (5) has forced the lower projecting pins (4) outward. Similarly, the upper pins (3) have been wedged outward by the descending bonnet legs, providing a tight seal between body wall (8) and seat, preventing entrance of abrasives between seat and body wall.

C. As gate is closed, leading edge of gate slides past wear ring (1), contacts rubber ring (2) for positive rubber-to-metal seal. Seal occurs before gate touches rubber cushion (3), eliminating need for "bumping." Relief in bottom of gate (4) allows straddling of solid particles that might interfere with proper closure.

Available at supply stores everywhere in 1,000, 1,500, 2,000, 3,000 and 5,000 psi working pressures . . . in two-, three- and four-inch sizes.

DRILLING EQUIPMENT MANUFACTURING CO.

Oklahoma City, Oklahoma

DRILLING EQUIPMENT MFG. CO. DEMCO OKLAHOMA CITY, OKLA. U.S.A.

Bowen-Itco last year, have been acquired for the operation.

Zack Griffin is area manager ... in the Permian basin for Johnston Testers, Inc., announced B. R. Dixon, vice president of operations. Griffin will locate at Odessa where he will have charge of operations in West Texas and eastern New Mexico. His experience with Johnston includes posts as service and sales engineer in Oklahoma City, assistant division manager at Denver, and administrative assistant in Houston.

New Canadian company formed ... according to James F. Connaughton, chairman of the board, as the successor to the Canadian division of Wheelabrator Corp., of Mishawaka, Ind. The firm—Wheelbrator Corp. of Canada, Ltd.—will handle sales and fabricating activities for all provinces in Canada.

Wheelabrator supplies airless blast-cleaning equipment, abrasives, and dust and fume-collection systems from its plant in Scarborough, Ont. It also has an office in Montreal. Harold M. Miller is president and Robert A. Campbell, vice president and general manager, is in charge of Canadian operations. General sales manager is J. D. Lamb.

United Specialties Inc. appoints ... H. Y. Martindill as general manager succeeding R. C. Morrison, who joined Metalock International, Long Island City, N. Y., as vice president and general manager. Martindill has been with United Specialties 7 years as plant manager and design engineer.

At the same time, the El Dorado, Ark. manufacturer of industrial hose and cable reels named Incorporated Sales Industries, of Houston, as exclusive manufacturers representative for Northeast Texas and western Louisiana.

Schlumberger opens new office ... just south of Columbia, Miss., to operate two logging units in the area. The service location is under the direction of C. D. (Chuck) Griffin.

"FLOLIGHT" DERRICK LIGHTING SYSTEMS

"FLOLIGHT" the quality derrick lighting system that requires no extra components.

When your drilling rig is equipped with a "Flolight" vaportight lighting system, you have a complete lighting arrangement. All motor leads, dog house lights, pump lights, etc., are included. There's nothing extra for you to buy.

"Flolight" systems are built specifically for drilling rigs, as a result you get more usable light for every dollar you invest. Each "Flolight" is mounted on a neoprene shock absorber that protects lamp filaments from breakage; eliminates the swaying of light fixtures in high winds. Light fixtures are constructed of aluminum alloy throughout, there's no enamel to chip, crack, or rust. Extra heavy, high temperature Pyrex lenses do away with cumbersome guards.

"Flolight" vaportight lighting systems are sold through supply stores everywhere.

HUTCHISON MANUFACTURING COMPANY

P. O. BOX 9335 • HOUSTON 11, TEXAS

A SUBSIDIARY OF REVERE ELECTRIC MANUFACTURING CO.

GROUND-BREAKING RITES for the new Otis general offices and plant to be constructed on the edge of Dallas in Carrollton, Tex., find L. D. Campbell, Halliburton Co. board chairman, congratulating H. C. Otis, Sr., chairman of the board of Otis Engineering Corp. Between them, from left, are Robert McInnish, mayor of Carrollton, and Robert H. McLemore, Otis president. Otis is a Halliburton subsidiary.

The 68-acre general office and manufacturing facility will encompass a two-story office, research and engineering building of 80,000 sq. ft., a 100,000 sq. ft. manufacturing plant, and an 8,000 sq. ft. fleet maintenance depot. Four parking areas to accommodate 450 automobiles will be included. Some 400 persons will work at the facilities which will more than double the size of the present Otis plant in Dallas.

Survival of the Fittest

A month in the woods with only a bare survival kit separates the men from the boys, with a vengeance. Darwin's law of the survival of the fittest still pertains today in connection with certain segments of the oil industry. And this matter of survival in the oil business is a deadly serious one, not separating the men from the boys, but the quick from the dead.

What can be described casually as a "technical readjustment" by someone in a newsletter is an entirely different matter to the man whose bread and butter are at stake. Many supply stores, for example, are looking for a survival kit of their own, after taking a long, hard look at the age of their receivables. What to do with receivables 90 and 120 days old requires as much skill and know-how as living a comparable time in the woods with only a pocket knife.

Unfortunately there's no magic wand, no miraculous rescue by helicopter. The best help you can get is from a man who knows your business, knows the oil business, and understands credit and the management of money. You'll find men like these in the Oil and Gas Department of The National Bank of Commerce of Houston. You'll find that if anyone can help you they can. But, remember, they work no miracles; so come before it's too late to help.

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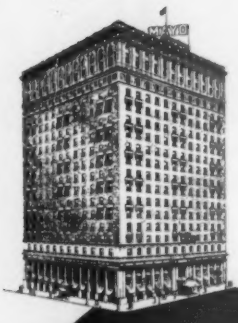

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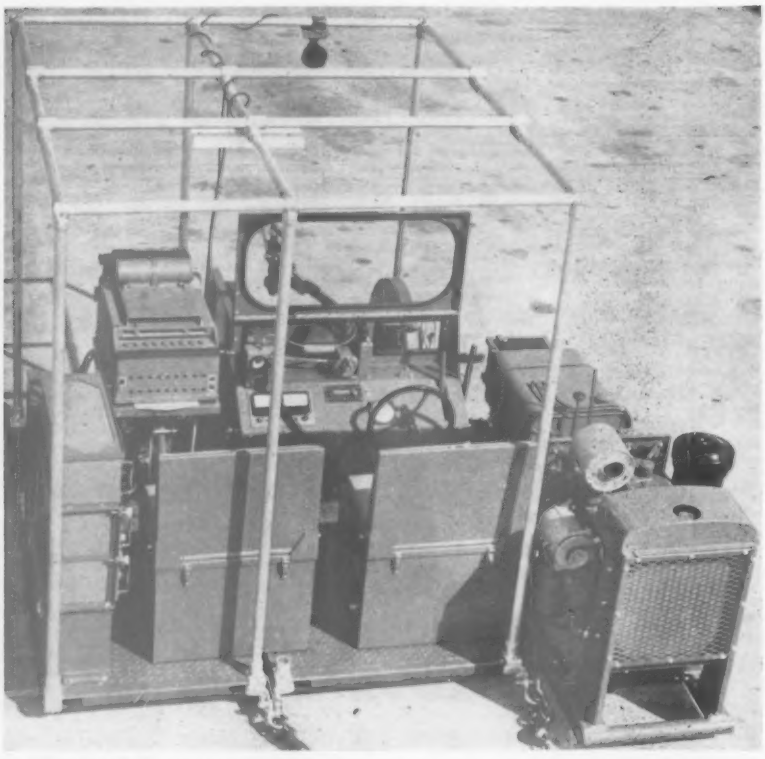


A SKID-MOUNTED lightweight logging unit has been designed by Schlumberger Well Surveying Corp. which is especially adapted to helocipter use. Composed of three sections, each less than 2,000 lb., the unit is readily transported.

Logging unit for helicopter use

A NEWLY DEVELOPED lightweight logging and completion unit has been designed which can be moved to inaccessible well locations by helicopter.

Schlumberger Well Surveying Corp. has divided the unit into three main sections each weighing 2,000 lb. or less. Weight is reduced further by the use of a small-diameter multiconductor logging cable with an 11,000-ft. capacity. Gross weight is reduced as compared to conventional cables on standard-sized units.

The firm has shipped several of these compact logging tools to Canada for use in wilderness sites. Schlumberger believes that this type of equipment is particularly suitable for certain offshore workovers where elbow room is at a premium.

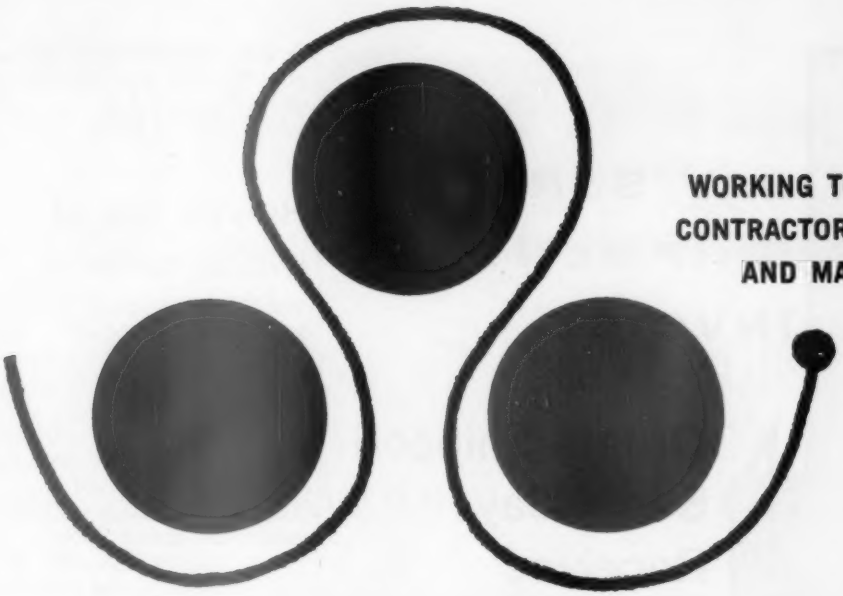
Firm opens new office in Mississippi

DRILLING and exploration offices for North American Oil Corp. of Delaware have been established in Jackson, Miss. E. G. Jeffreys, vice president will be in charge of the office located at 509 Plaza Building.

Headquarters of the firm are at Brookhaven, Miss., and the company was formed by F. W. Williams, Jr., Brookhaven, last year. Key areas of operation for North American is in Mississippi and Louisiana.

The firm has two Emsco rotary rigs which are rated for drilling depths to 13,500 ft. and to 15,500 ft. One of these rigs is currently working on a company well, North American 1 Board of Supervisors in 16-8n-7e, Lincoln County, Mississippi. Present depth is below 9,500 ft.

The second rig is in the Wilmer



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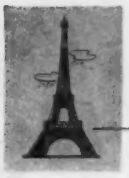

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field of Tangipahoa Parish, Louisiana. North American drilled the discovery well for this field last year.

Here's a tally of wildcat successes

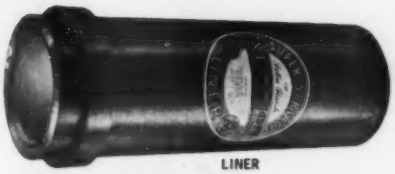
WILDCAT WELLS should be of interest to the contractor because often his longevity in a new area is directly proportional to the success of the exploratory effort. Usually a new pool opener will mean continued work and fewer long-distance moves. How then, did the wildcat wells in the different sections of the nation fare during 1960?

In a state-by-state tally, the past year compares to the previous year as follows:

In 1959, West Virginia led all states with a wildcat success per cent of a whopping 79.3, with 23 out of 29 gas wells completed. The next five leading states were: Ohio 38.5%, 7 oil and 8 gas wells out of 39 starts; North Dakota 23.8%, all oil; Oklahoma 22.9%, 97 oil and 93 gas and condensate wells out of 827 attempts; Alaska 22.2% with 1 oil and 1 gas out of 9 trials; and Pennsylvania 19.0%, 4 gas wells out of 21 starts.

Last year saw more selective drilling and the national wildcat success average was 13.5% as compared with an average of 13.2% in 1959. Although this figure didn't climb much over-all, there was marked improvement in certain states. Seven states were considered the wildcatter's haven in 1960. They include: West Virginia again leading the pack with 36.4% success; Oklahoma 30.4% with the accent in new oil finds; New York 29.5%, all gas; Ohio 25.4% with gas finds exceeding oil strikes over 3 to 1; Kentucky made a fine showing with 25.1% with 42 new oil areas and 14 gas discoveries; and Alaska and Pennsylvania each had 25.0% success scores. It is surprising to note that the older producing areas of the country are still indicating renewed interest and equally rewarding results.

The footage figures for wildcat drilling during the last 2 years are worthy of note. In 1959 the average wildcats well went to 4,797 ft. for the 10,073 wells drilled.

The Mission  Mission

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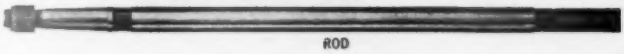
Mission  Mission

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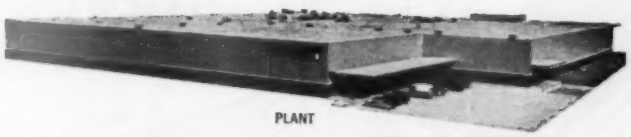
are all designed and made in our modern  to work together to cut your drilling costs.

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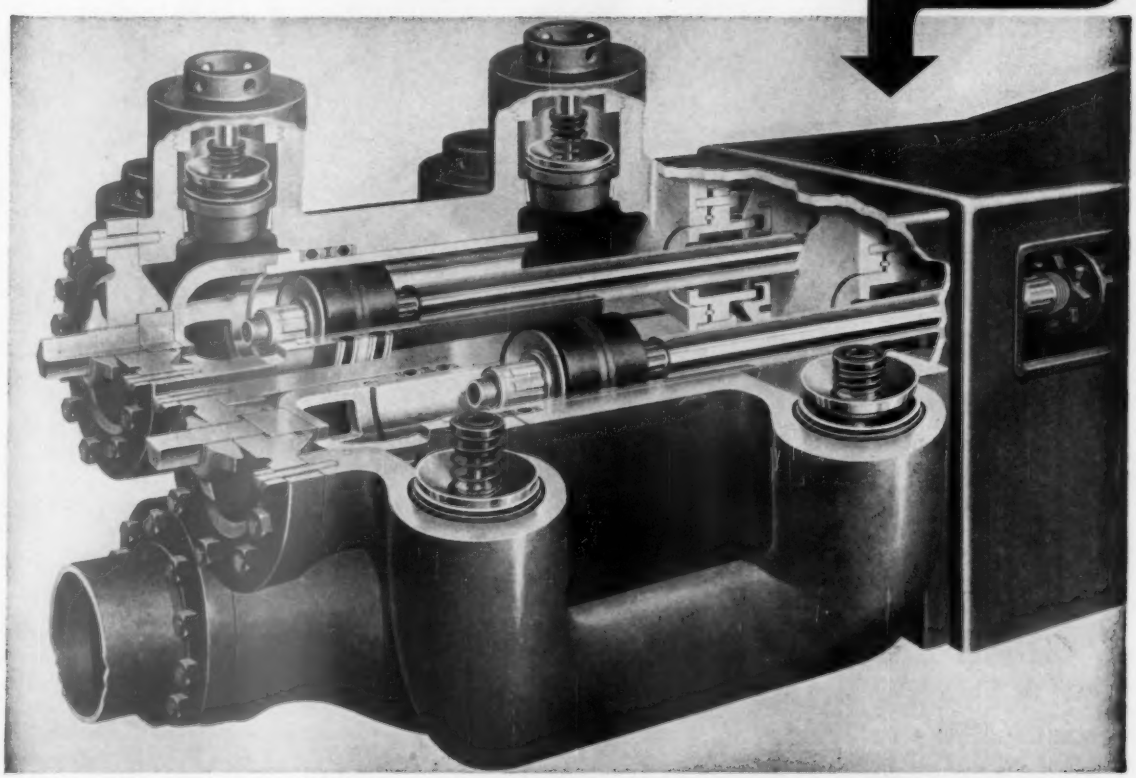

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MONTANA'S "MYSTERY" FIELD at Tule Creek, Roosevelt County, is the center of much exploratory interest as nine wells drill toward the Nisku-Devonian objective. So far, 2 oil wells, 6 rumored dry holes, and 10 new locations have dotted the area since the discovery last October.

Tight-hole field may loosen up February 14

BY FRANK J. GARDNER

UP IN THE Tule Creek country of Roosevelt County, Montana, where even the dry holes are tight holes, things may begin to pop soon. Last month, everything hinged on the January 17 land sale staged by the Fort Peck Indian Agency. Following that, results of drilling in the area were supposed to have been released in a golden flood of dope. But on January 16, a second sale was announced by Fort Peck for February 14. And the dope freeze set in again.

A doubtful tally . . . Meanwhile, back at the field, Williston's wackiest boom, where everybody is scorekeeper and nobody knows the score, went its merry way. As far as anyone can tell, the Tule Creek tally now reads like this:

- Two oil wells (that's not sure; only the discovery has been potentialed).
- Ten locations (that's for sure; the operators have announced them).
- Six dry holes (that's not sure; two are "written off" but doubtful).
- Nine wells drilling (that's for sure; they're getting deeper every day).

To add to the comic aspect of this cloak-and-dagger play, a dark horse went to the January 17 sale and waltzed off with most of the choice acreage (OGJ, Jan. 23, 1961, p. 58) . . . a dark horse only in the sense that it had done no drilling in the field, for Shell Oil Co. has long had an interest in northeastern Montana.

And low bids . . . Top bid at the sale was Shell's $350.35 per acre for Tract 60, 1 to 2 miles southwest of the two supposed producers.

Murphy Corp. started all this activity last October 31 when it completed its 1 Sletvold in Section 18-30n-48e for 476 bbl. of oil per day from Nisku-Devonian pay at 7,660-92 ft.

Following the Sletvold find, landmen, geologists, promoters, geophysicists, and scouts from all over the Rockies set their sights on Tule Creek. Everyone got into the act. But the villain of the piece soon made an entrance. Murphy's confirmation test, 1 Zimmerman, only ½ mile east of the discovery, was a dry hole. Total depth was 7,775 ft., and that's all that's known of the well so far.

This first failure dampened the ardor of most observers in the area. But a couple of weeks later, Placid Oil Co. is said to have flowed oil on drill-stem test of its 1 Lough (Section 13-30n-47e), and the play was on again. Nothing more has ever been released on the Placid well, but it is assumed to be the second oil well in the field.

Make an interesting play . . . Now we can look forward to the forthcoming Fort Peck sale. Land involved covers 181 tracts and more than 41,000 acres. It's scattered through townships 29n through 31n, and ranges 46e through 49e.

As a prelude to the sale, the next three pages provide geologic background. Geologist John C. Kinard, of Phillips Petroleum Co., Billings, Mont., has prepared this study of the regional geology of Tule Creek. You'll note that his rumors are slightly different from ours, but that's the way the ball bounces at Tule Creek these days. Let's hope that operators in the field will loosen up on February 14 and send valentines to each other . . . in the form of logs, samples, and cores.

Geologists appraise Tule Creek area

IN OCTOBER 1960, Murphy Corp. et al., completed the 1 Sletvold, SE SE 18-30n-48e, Roosevelt County, Montana, with an initial potential flowing 476 bbl. of oil per day through a 14/64-in. choke. Perforations at 7,660-92 ft. were in the Devonian Nisku formation.

This remote wildcat discovery, in a formation which had not previously yielded production in Montana but from which numerous oil shows had been described, created a sensation in the Rocky Mountains.

A flurry of leasing ensued and many locations were announced. Within weeks, a 1½-mile stepout discovery was rumored. At present, ten wells are drilling or testing and an additional eight locations have been staked. The score to date includes four rumored oil wells and four rumored dry holes. Three of the four dry holes were wildcats and were 2½ to 9 miles from the 1 Sletvold.

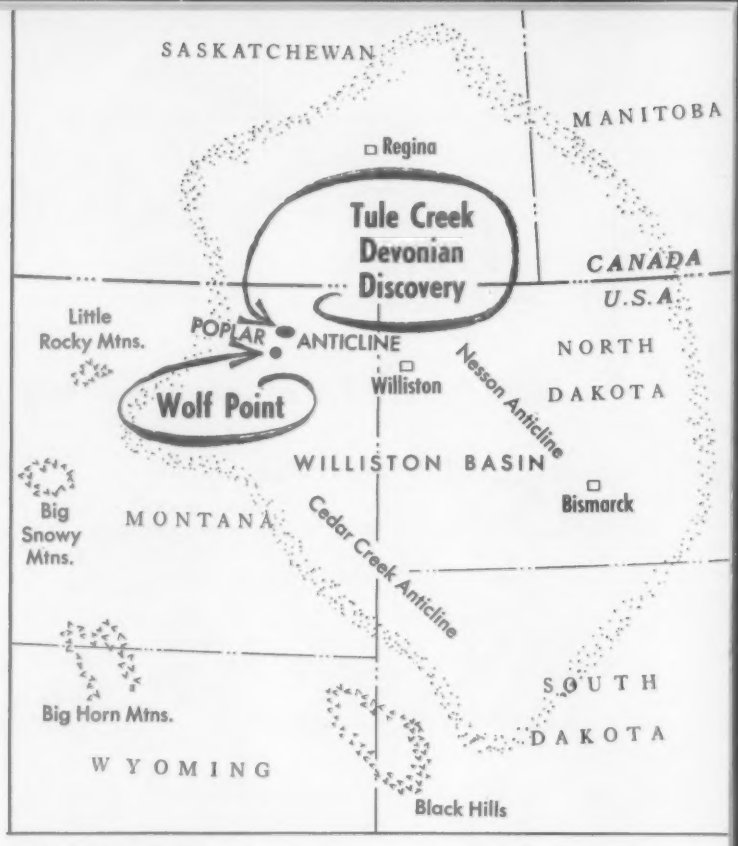
No details. No information has been released on any of these wells except the initial discovery. This is a result of the many open Indian tracts in the immediate vicinity. Sealed bids were received on these tracts at the Fort Peck Reservation sale on January 17, 1961. Prices paid as high as $350.35 per acre indicate the extreme interest in this area. Another Indian sale in this same area will be held February 14, 1961.

The Poplar anticline, along which the Devonian discoveries have been drilled, is defined as that anticlinal trend which projects southeastward off the Bowdoin dome and terminates in the East Poplar dome.

Stratigraphy

The beds exposed in this area consist of the Tertiary and Upper Cretaceous. Gas production has been found in the huge Bowdoin field to the west in sands in the upper Colorado group of the Cretaceous. Scattered well control indicates these sands are not well developed on the Poplar anticline; however, local occurrences would offer attractive traps for gas accumulation.

The Judith River sand in the Montana group of the Cretaceous is well developed along the anticline and offers good opportunities for gas production. This sand has had gas shows in scattered wells and is reported to have produced some flammable gas at an old well in the town of Wolf Point. This well encountered a gas sand at about 1,100 ft. that is undoubtedly the Judith River. Many of the tests drilled in this region do not mud up before penetrating the Judith River; consequently, this gas zone could easily be overlooked.



MONTANA's recent Tule Creek discovery set off a flurry of exploratory excitement not known in Williston since the Burke County play. Fig. 1.

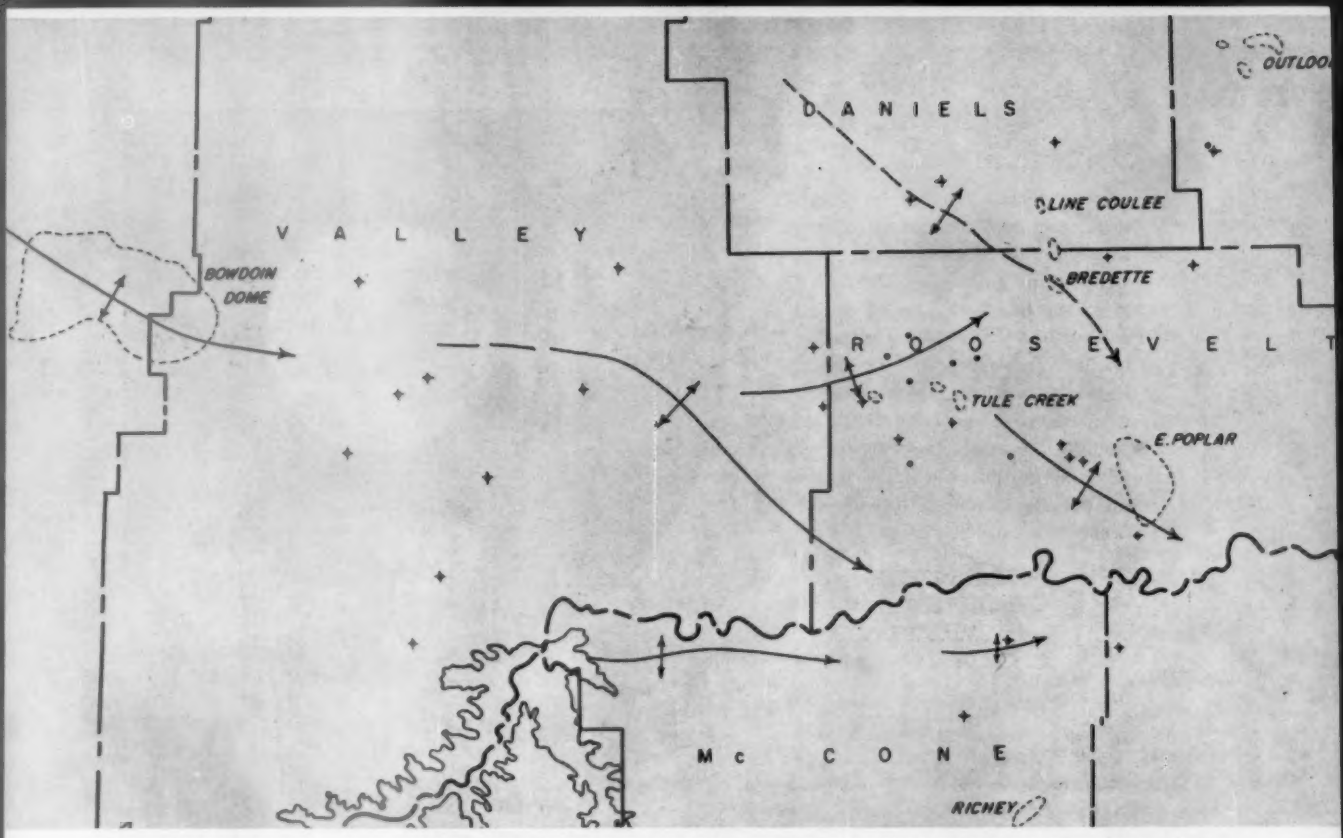
Jurassic. The Jurassic does not contain any appreciable reservoir beds in this area. It overlies unconformably the Triassic and Mississippian. The Jurassic loses section by nondeposition at the base, progressively westward and updip onto the Bowdoin dome.

Triassic. The Triassic - Spearfish formation is present over most of the area and consists of red shales and siltstones with very few reservoir characteristics.

Pennsylvanian. The Pennsylvanian is present in the eastern part of the area and consists of the

About the author...

JOHN C. KINARD is an exploration and development geologist for Phillips Petroleum Co. at its Billings, Mont. office. His work centers on problems dealing with Montana and the Williston basin. Previously he worked with Texaco Inc. doing surface and subsurface geology in Colorado and Wyoming and before that he was with Core Laboratories, Inc., in Shreveport, La. Kinard attended Centenary College of Louisiana and was graduated from the University of Oklahoma where he received BS and MS degrees in geology.



DRILLING ACTIVITY along the Poplar anticline has been confined to East Poplar field itself until Tule Creek. The area northwest of the Poplar area has been virtually untested until now. Fig. 2.

Amsden formation. The Amsden is composed of an upper carbonate member and a lower clastic member. The lower clastic member contains local sand developments which have proved productive at East Poplar field. These sands are believed to be equivalent in part to the prolific Tyler producing sands in Central Montana. The pinchout of these sands updip along the Poplar anticline provides excellent traps for oil accumulation.

Mississippian, Big Snowy group. The Big Snowy group from top to bottom is composed of the Heath, Otter, and Kibbey formations. The Heath is believed absent in this area. The Otter shale and the Kibbey sand are truncated to the northwest along the anticline. The absence of the Otter in the Wolf Creek area discloses a definite thinning in the Big Snowy sediments along the anticline. This thinning is indicative of pre-Pennsylvanian movement signifying the anticline is an ancient feature thereby offering good potential for oil accumulation in the Paleozoic rocks.

The Kibbey is a fine to coarse-grained sand with good porosity. It is capable of production in a limited number of wells at East Poplar. The pinchout of the Kibbey sand updip to the northwest along the Poplar anticline is an ideal trap for oil.

Madison group. The Madison group consists of the Charles, Mission Canyon, and Lodgepole formations. The Charles and Mission Canyon offer the most attractive reservoir beds. Oil production is obtained from numerous porosity zones in the Charles at East Poplar; however, these zones become salt-plugged in scattered wells around the field. It is doubtful that this salt plugging of porosity is persistent along the anticline since many wells have encountered large amounts of fluid on drill-stem tests. Therefore, excellent opportunities exist for Charles accumulation along this feature.

The Mission Canyon has local developments of good porosity. Such a development, known as the "Fast" zone has been productive at Wolf Creek field. This field, although very small, points to the potential of the Mission Canyon in this region.

The Lodgepole is usually quite shaly and lacks good porosity in the basin. Production associated with faulting was established recently on the Cedar Creek anticline; consequently, this formation should not be overlooked as a possible reservoir.

Bakken. The Bakken consists of two highly radioactive shales separated by a siltstone or limestone. The middle siltstone is often quite sandy and under favorable conditions could provide an adequate trap for oil along the anticline. Oil shows have been described in a few wells in the area.

Devonian. The Devonian is composed from top to bottom of the Nisku, Duperow, Souris River, Dawson Bay, Elk Point, and Ashern. Each of these formations or groups has proved productive in the Williston basin, notably at Nesson, Cedar Creek, Richey, and Outlook. Many of these formations have had oil shows in the Poplar area, and with sufficient structural advantage, they would be productive along the anticline. The Nisku or Birdbear formation is considered the primary objective in view of the Murphy discovery.

Nisku. The Nisku undergoes po-

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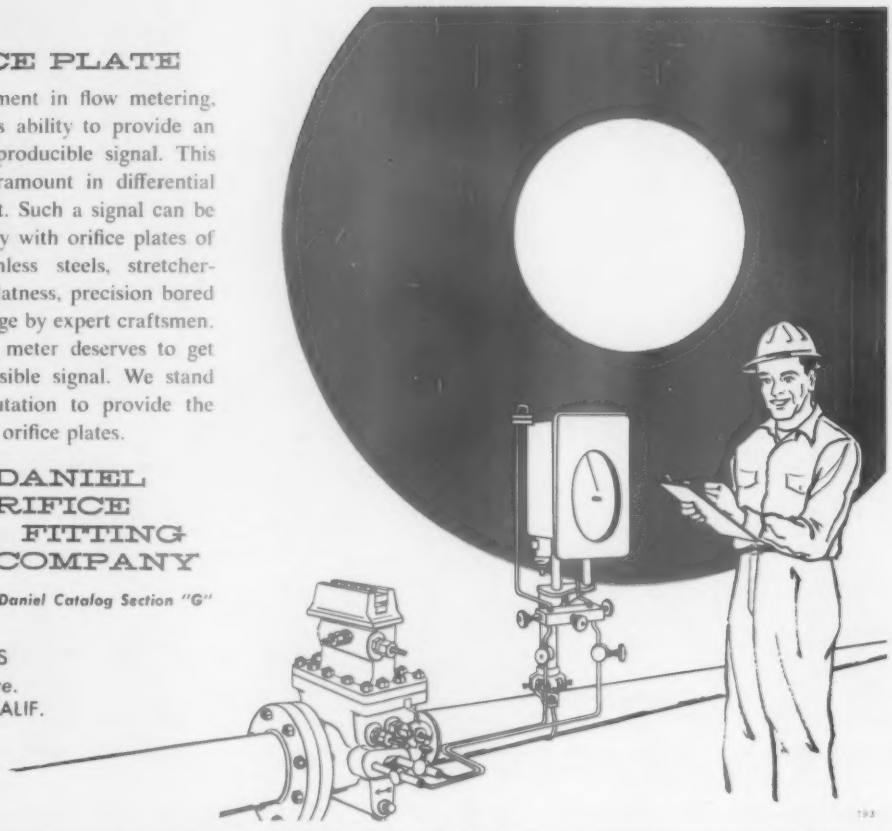

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rosity and lithologic changes in the Poplar anticline area. The porosity buildups may be due to dolomitization on ancient structures. A definite change in lithology from carbonate to anhydrite is noted. Regardless, the presence of 50 ft. or more of porous Nisku have good permeability, offers an excellent reservoir for oil. This reservoir, coupled with the expected numerous local features along the Poplar anticline, provides ideal conditions for oil and gas accumulation.

Pre-Devonian. Reservoir beds below the Devonian are in the Silurian, Ordovician, and Cambrian. The Silurian is productive at Outlook and in numerous other fields in the basin. It is a very good reservoir and yields large reserves. The same is true of the Ordovician, which also produces at Outlook. The Cambrian, although not productive in this vicinity, has good sand developments which could provide accumulation. Sufficient structural advantage along the anticline would provide an oil trap in each of these systems.

Structure

The Poplar anticline, as previously mentioned, plunges southeast off the Bowdoin dome and terminates in the East Poplar dome. This trend is approximately 65 miles long and 20 miles wide. Regionally, the Poplar anticline is on the west flank of the Williston basin and is one of the most prominent structures in the basin. The structures in this area received their present configuration as a result of the Laramie orogeny which occurred mainly in late Cretaceous and early Tertiary time. In addition, the Poplar anticline is a more ancient structure as indicated by the thinning of Paleozoic beds along the crest. Previous drilling in the Williston basin shows that structures which were active in pre-Jurassic or pre-Mississippian time offer the maximum potential for oil and gas production in Paleozoic rocks.

Drilling activity along the anticline has been mainly confined to the East Poplar field area where excellent Charles production is encountered. The area to the northwest of the field is practically untested.

Extensive subsurface and surface work in the Poplar area depicts the presence of additional structural alignments which appear similar to the main Poplar anticline. These alignments have not been drilled although they offer excellent productive possibilities.

Summary

The Poplar anticline area is relatively untested although numerous structural and stratigraphic traps for oil and gas are present. The Murphy - Devonian discovery at Tule Creek, which gaged flows up to 46 bbl. of oil per hour, has revived this attractive geologic region. The present drilling program is expected to uncover a new oil province in the Williston basin.

Acknowledgment

The writer is grateful to CAJR Exploration, Inc., for permission to publish this condensation of a more detailed report of the Poplar anticline area.

Michigan interest is uncertain

IS THE DESIRE to get a piece of Michigan action as great as a year ago?

Oil companies and individuals swept across the northern end of the state in particular leasing up thousands of acres and then bid hard against each other for leases on state lands in two Conservation Department auctions. The state sales averaged 94 cents and $1.69 an acre, respectively, with prized areas reaching into the $5 bracket.

So far there has been little actual drilling in far-northern Michigan where the Trenton may run from 4,500 to 7,500 ft.

State officials hope the interest is still there and have posted a record 213,000 acres of state land for lease (by the auction system) starting February 15 in Lansing. Lands Chief Charles Millar said arrangements have been made to run the sale for 3 days if necessary. There are 2,619 separate listings to be called.

Millar said he expected full clarification of the state's policy on actual drilling on state lands located in "recreational use" areas. Late last fall the Conservation Department refused a drilling permit to Humble Oil & Refining Co. to drill on a state lease in the Waterloo recreation area, Jackson County. Refusal was on the basis of conflict with public use.

The Oil and Gas Association of Michigan has taken official recognition of the Waterloo incident and is making specific recommendations to the state for clarification of its policy.

Tristate-area action keeps drillers busy

In Illinois, Gentles Drilling Co. et al. are testing the O'Hara at 2,898-2,903 ft. in the 1 Otto Henn, NE NW NE 23-8s-5e, Saline County, 2 miles northeast of Harco.

The well flowed oil on a drill-stem test through casing. In Sangamon County, R. E. Neat Petroleum Co. 1 Clayton, SW SW SE 19-14n-4w, pumped 120 bbl. of oil the first day from Silurian at 1,700-20 ft. This one is 7 miles west of Edinburg.

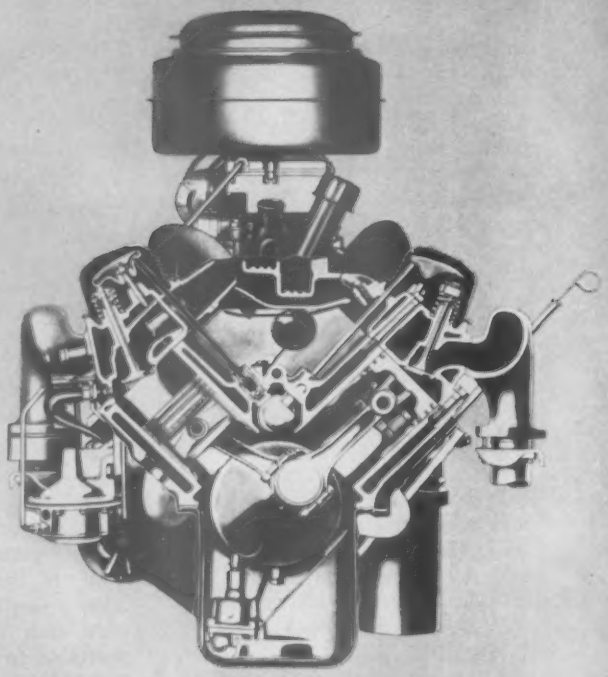
In Clay County, Samuel E. Boxell is pump testing in McClosky at 3,000-17 ft. at 1 Walter Leonard "B," SW SE SW 29-5n-8e, ¼ mile stepout test west of Ingraham. Recovery on drill-stem test at 2,999-3,021 ft. was 2,198 ft. of clean oil, 120 ft. of oil and gas-mixed mud.

In Franklin County, E. A. Obering 2 Webb-Thurmond, SW NW NE 16-5s-4e, the second Warsaw producer in the new area 3 miles northwest of Macedonia, pumped 60 bbl. of oil and 5 bbl. water per day at 3,947-53 and 3,970-84 ft.

Kentucky. Parker and Morgan 1 Harold Richmond, 12-N-28, 2 miles southeast of Panther in Daviess County, pumped 40 bbl. per day from O'Hara at 1,884-89 ft. Location is 1 mile from similar production.

Indiana. In Posey County, two more producers were added to the new Aux Vases area 7 miles southwest of Mount Vernon. W. O. Eckstein-Kennard 2 Yellow Pont et al., NE NW NE 8-8s-14w, flowed 200 bbl. per day after fracture in the Aux Vases at 2,652-65 ft. In NE SW SE 5-8s-14w, F. E. Anderson & Sons 3 Rosa Lawrence, flowed 300 bbl. per day from Aux Vases at 2,650-67 ft. •

1 Extra strength where it counts gives Chevy cabs rock-solid rigidity to stay in shape years longer.



2 Chevy's powerful, efficient Taskmaster V8 combines big-truck might and muscle with top operating economy.

3 Independent Front Suspension with "walking wheel" action paves the way to bigger earnings with a smoother ride and reduced maintenance expense.

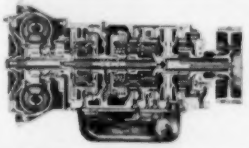
DEEP-DOWN DURABILITY SAVES YOUR DOLLARS IN 1961 CHEVROLET MEDIUM-DUTY TRUCKS

Here are Chevy components that add to tough-truck durability and earning ability; the *strong* reasons why a Chevrolet middleweight can take plenty of punishment—and keep on taking it. Here's why these rough-and-ready haulers squeeze bonus earnings out of tight budgets!

1 Take a look at the Chevy cab (pictured at left). It's built *solidly* to take any poundings your rough-and-tumble runs can throw its way; to stay in shape for years, lengthen effective truck working life and minimize maintenance expense. Notice the husky longitudinal sills that reinforce the cab underbody to reduce vibration and provide a solid foundation for cab sheet metal. Check the extra sturdy door openings with box-section pillars and sills to keep doors weather-tight and in lasting alignment. See how the husky box-section pillars support the rigid, double-walled roof panel for greater safety and maximum cab strength. (And this cab is just as *comfortable* as it is rugged!)

2 More evidence of Chevy's deep-down strength and toughness can be found beneath the hood. There you'll find the *261-cubic-inch Jobmaster 6* —a work-proved dollar-saver. Its sturdy components—forged steel crankshaft, high-alloy inlet valves, precision bearings, hard-faced exhaust valves with Rotocoils, all-weather electrical system and many more—are solid assurance of maximum efficiency and economy. Or the big *283-cubic-inch Taskmaster V8* illustrated at left (optional at extra cost) to supply plenty of torque to move maximum payloads with minimum strain or wear. Low maintenance costs stem from features like aluminized high-alloy inlet valves, hard-faced exhaust valves with Rotocoils and Moraine 400 precision bearings.

3 Chevy's bump-beating Independent Front Suspension system provides still another reason for dollar-saving durability. Tough, friction-free torsion springs cushion the ride; ruggedly built control arms guide each wheel to give sure, stable handling; sturdy, custom-tailored shock absorbers further reduce road shock and offer maximum ride control. The result is a new kind of smooth truck ride that lengthens truck life; cuts wear and tear to reduce maintenance. These reasons for ruggedness go on and on to help reduce your costs. They're all the result of Chevy's *deep-down durability*. See your dealer about it soon. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



CHEVROLET POWERMATIC, developed especially for big truck duty, provides fully automatic driving ease for all Series 60 and 60-H models (optional at extra cost). With six forward speeds in four driving ranges, plus torque converter action for getting under way and cushioning drive-line shifting shocks, Powermatic adjusts automatically to load and road conditions.

1961 CHEVROLET STURDI-BILT TRUCKS

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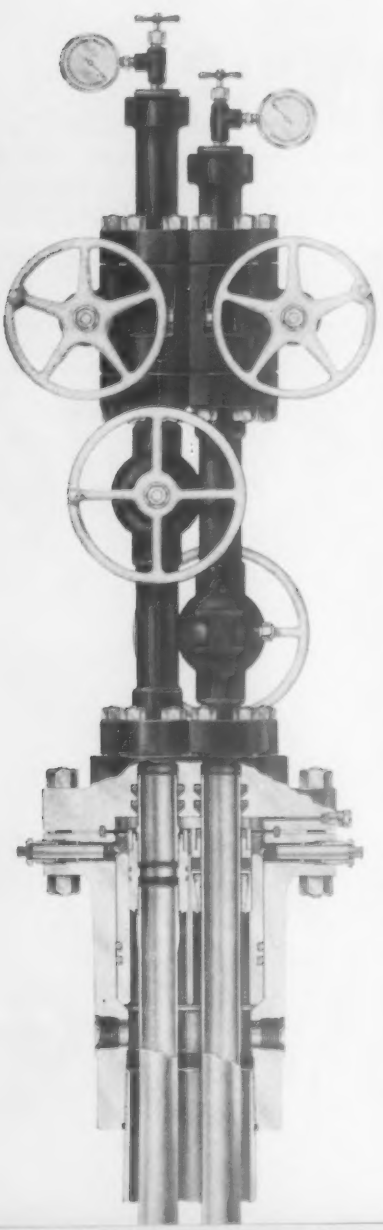
greater flexibility and simplicity in tubingless completion equipment



The challenge was tubingless completion equipment featuring simplicity, flexibility, utility and "controllability." And here is the answer.

- Hangers are interchangeable. Thus, one, two, three or four strings of tubing can be hung in a head simply by changing hangers. Moreover, screwed or slip type interchangeable hangers are provided. Regular hanger couplings can be provided with or without the back pressure grooves.
- The complete series of hangers is produced to fit O-C-T Type CM, C-18, or C-19 Casing Heads and hangers for C-18 and CM heads are interchangeable. All hangers are designed to allow conventional cementing procedures, even providing for reciprocation of the tubing while cementing and simultaneously cementing through two or three strings of tubing.
- The Christmas Trees for use with O-C-T tubingless completion equipment can be provided with screwed connections, individually flanged connections or block type valves in the case of duals, triples or quadruples.
- For use with the several types of trees, O-C-T manufactures a complete line of 2½-inch tubing heads in which ¾-inch through 1½-inch tubing can be hung with any one of a complete family of interchangeable hangers.
- All hangers are designed to be run through blowout preventers.
- Available in pressure ratings up to and including 10,000 psi working pressure.

If you want to take advantage of tubingless completion on your next well, talk to the O-C-T representative nearest you. He can show you the best in tubingless completion equipment.

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where progress is a daily practice

Lower Fry is new pay in Runnels County, Texas

Lower Fry production was reported in North Winters field, northwestern Runnels County, West Texas. Discovery is Roy Guffey Oil Co. 1 Ira McNeill, John L. Lynch Survey 442, 8 miles west of Winters.

The well completed pumping 124 bbl. of oil daily from perforations at 4,527-32 ft. Suggested field names are McNeill or South Wilmeth fields.

Pecos discovery. Southern Minerals Corp. and General Crude Oil Co. 1-A Jasper CSL, wildcat and indicated Ellenburger Cambro-Ordovician gas - condensate discovery in southeastern Pecos County, 30 miles southeast of Fort Stockton, flowed 13 M.M.c.f.d. with a heavy condensate spray during drill-stem in the Ellenburger at 10,442-10,540 ft. Location is in Section 1, Block 104, Jasper CSL Survey. It lies 2 miles northeast of the 1 Jasper CSL, new Clearfork and Canyon reef discovery.

Martin County. Texas National Petroleum Co. completed a flowing Wolfcamp Permian oil discovery in southeastern Martin County, 1½ miles southeast of Stanton.

The well, 1 Jim Tom, flowed 186 bbl. of 42°-gravity oil per day on test through 16/64-in. choke from perforations at 9,220-55 ft. Location is in Section 30, Block 34, T-1-S, T&P Survey, 2¼ miles southwest of Gordon Street Wolfcamp field.

Good producer finaled in cluster of dusters

Ferguson Mississippian field was opened in southeastern Archer County in North Texas at Tom C. Ferguson et al. 1 Garvey. The well flowed 583 bbl. of oil daily from perforations at 5,320-40 ft. Location is 10 miles southeast of Archer City in the Joseph Levins Survey, A-260. Dry holes surround the discovery. It lies 1 mile northwest of L.-G. Mississippian field.

Ohio adds new Oriskany

In Ohio, more Oriskany production has been found in Ashtabula County.

A scheduled Clinton test by James Drilling Co. on 1 H. & S. Warpula,

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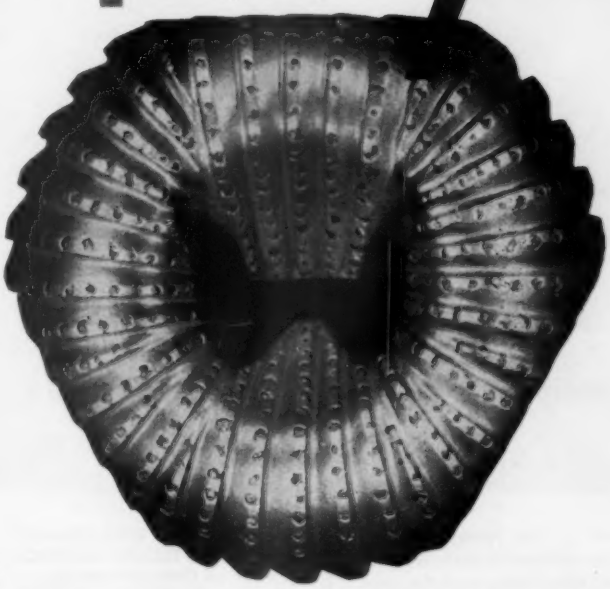

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Section 21, Monroe Township, had a natural gage of 7,700 M.c.f.d. in the pay from 2,039-41 ft. with a rock of 850 psi.

This completion is about 10 miles north of Sun Oil Co. et al. 1 M. Hudson, discovery in Pierpont Township.

Deep test. In Canaan Township, Wayne County, preliminary reports indicate the 1½-mile stepout to C. R. Obermiller Cambro-Ordovician discovery, 1 J. Henderlong, Section 36 (OGJ, Aug. 29, 1960), is a potential producer.

The operator, B. B. Mulvaney, is still drilling and testing the 1 A. Winkler, Section 24, that gaged good shows of gas with some distillate.

Yearbook stresses Red Cave gas play

An 80-page special report on the booming Red Cave gas play in the Texas and Oklahoma panhandles is a highlight of the 1961 Hugoton Embayment-Anadarko Basin Yearbook, just published by National Petroleum Bibliography, Box 3586, Amarillo.

Covering a semiproved area of more than 250,000 acres, the play is result of the discovery of a shallow (1,400-2,700 ft.) gas pay in a 40-year-old producing province. Fifty Red Cave producers had been drilled by the end of 1960, and the first two weeks of 1961 saw more than a score of new tests staked.

Initial potentials from the shallow pay have ranged from 1 to 14 M.M. c.f.d. of gas, with a rock pressure almost virgin for the region. During 1960 it was revealed that two early-day wells, believed at the time of their completion to be producing from regular Texas Panhandle pay, had instead produced nearly 90,000 M.M.c.f. of gas from Red Cave.

The new book, in 250 large-size pages, contains geological structure maps and isopachs on 72 producing areas in the Texas Panhandle, western Oklahoma and southwest Kansas. Also included are discovery well, geological, reservoir and economic data on more than 200 oil and gas fields, most of them discovered in 1960.

New map covers East Texas area

A wide range of field and geological data is covered in a new "Oil Executive's Reference Map for East Texas," published by Geo Map Co., Dallas.

The map is designed to serve the land man, drilling contractor, geologist, scout, independent operator, or engineer. Shown are:

1. All oil and gas fields, each with a color legend denoting its producing horizons.
2. A columnar section with the names and geologic age of producing horizons.
3. A depth chart identifying producing horizons encountered in each 1,000 ft. of section, and areas where they produce.
4. Year of discovery, cumulative oil production, and average cumulative oil production per well in every field.
5. Regional geological structure contoured on the base of the Austin chalk.
6. Location of major tectonic features, and all salt domes.

The full-process color map is a companion to the East Texas Jurassic map published by the same company last July. Over-all size is 35 by 45 in. With a scale of 1 in. to approximately 5 miles.

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group frac treatment of five flood producers gives 7-day payout

A waterflood operator boosted production 153 bopd by fracturing five wells. The cost of all five treatments was paid out with less than seven days production.

This story illustrates how Dowell engineers work with operators to help them boost profits and hold down operating costs.

Profits were boosted in this instance by using the Frac Guide* to design the treatments.

By carefully scheduling jobs, the operator was able to hold treatment costs down and take advantage of group treatment rates.

Pay was the El Dorado Shallow Sand in Butler County, Kansas. Depth ranged from 550 to 760 feet. Waterfrac was employed. 2600 gallons gelled water, 5000 pounds 20-40 mesh sand and 2000 pounds 10-20 mesh sand were used for each well. Average injection rate was 12.5 bpm.

Total oil production from the five wells before treatment was 21 bpd. Stabilized production of oil after treatment was 174 bpd . . . an 8-fold increase. Net sale price for oil was $3.00 per barrel.

Talk over your production problems with your Dowell man. Get his help in designing treatments to cut operating costs, boost production or both.

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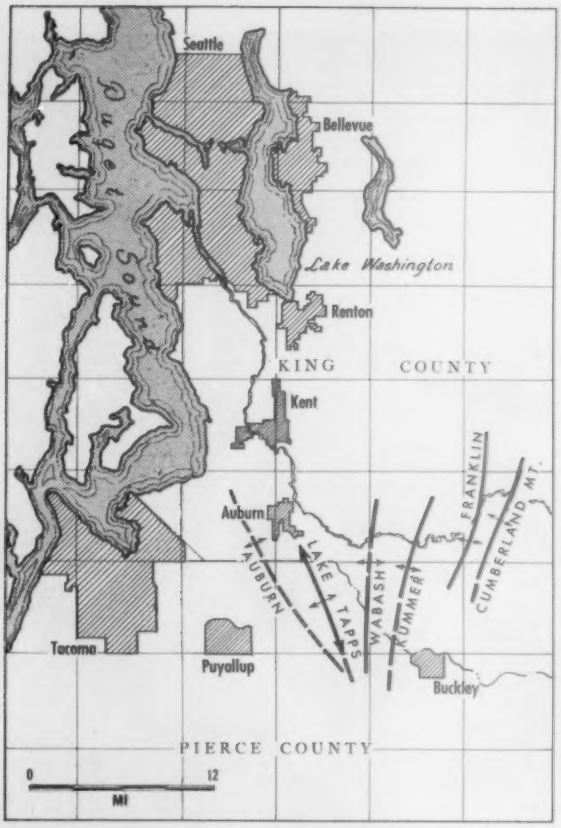
Washington driller aims to hit oil pay

BY R. J. DEACON
Northwest Oil Report,
Portland, Ore.



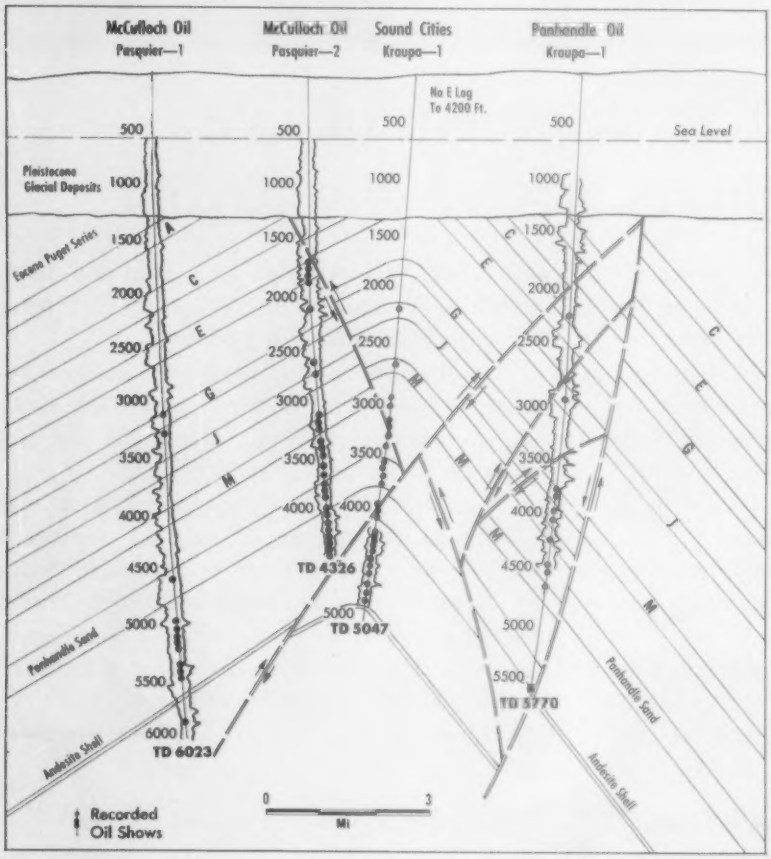
THIS MAP shows location of several anticlinal folds. A currently drilling wildcat here could open an entire new basin for the oil country. Fig. 1.

THE CURRENT TEST of A. E. McCroskey Syndicate in the Green River district, King County, Washington, is being programed for oil production. Operator has production casing and tubing on the location at 1 Brandt, 34-21n-6e (see Fig. 2). The well is aimed at Eocene Puget sands at a depth of 3,500 ft.

McCroskey is not fooling around on this one. The structure is there and about 500 bbl. of oil was produced from the Sound Cities 1 Bobb during a 14-hour period, according to McCroskey. The 1 Bobb is located about 100 ft. north of the 1 Brandt, currently drilling below 1,000 ft. J. Q. Anderson, consultant, Bakersfield, Calif., has the two wells located on the northeast flank of the Kummer anticline within fault closure developed on the northeast flank of the structure (Fig. 2).

It will seem strange to some that an operator is so confident in a wildcat well, which if successful, would mean a new basin, new field, and really a new state discovery if the well were to prove commercial. But McCroskey is confident. He has looked at the Kummer anticline in the canyon of the Green River northwest of Enumclaw for the past 20 years.

During this period McCroskey has promoted nine wells, including the 1 Brandt, all of which were located on the Kummer. The last three previous attempts were by the McCulloch Oil Exploration Co. of California, a substantial southern California independent. These included



IN KING COUNTY, A. E. McCroskey Syndicate is working at a well on the northeast flank of the Kummer anticline within fault closure developed on the northeast flank of the structure. This is a structural cross-section of the northern end of the anticline. Fig. 2.

FRACTURING SUCCESS

may depend on your selection of the

RIGHT PROPPING AGENT

FIRST . . .

AND FOREMOST

IN FORMATION

FRACTURING

These three photomicrographs represent the business end of a fracturing job. These particles have to keep the fracture open when the treating pressure is released. Enlarged several times, they may even look alike . . . but they don't *act* alike! Knowing which one will work *best* in your well may mean the difference in the success of the treatment.

On top of the heap is a grain of Ottawa Sand, the most popular type of propping agent used today in formation fracturing. In many formations, sand grains will adequately prop the fracture to permit increased reservoir drainage. However, formation characteristics may be such that sand grains will crush and shatter or embed, allowing the fracture to "heal" . . . what then?

The answer to these conditions frequently lies with the other two propping agents shown above. Aluminum pellets, or processed walnut hulls will not normally shatter under extreme loading. Instead, they tend to deform to a wafer-like shape, still providing propping support for the opened fracture.

Your Halliburton man will be glad to assist in having a core sample from your well tested so you may select the best propping agent for a particular formation. See him before planning your next fracturing treatment.

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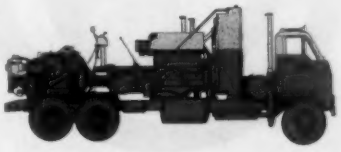

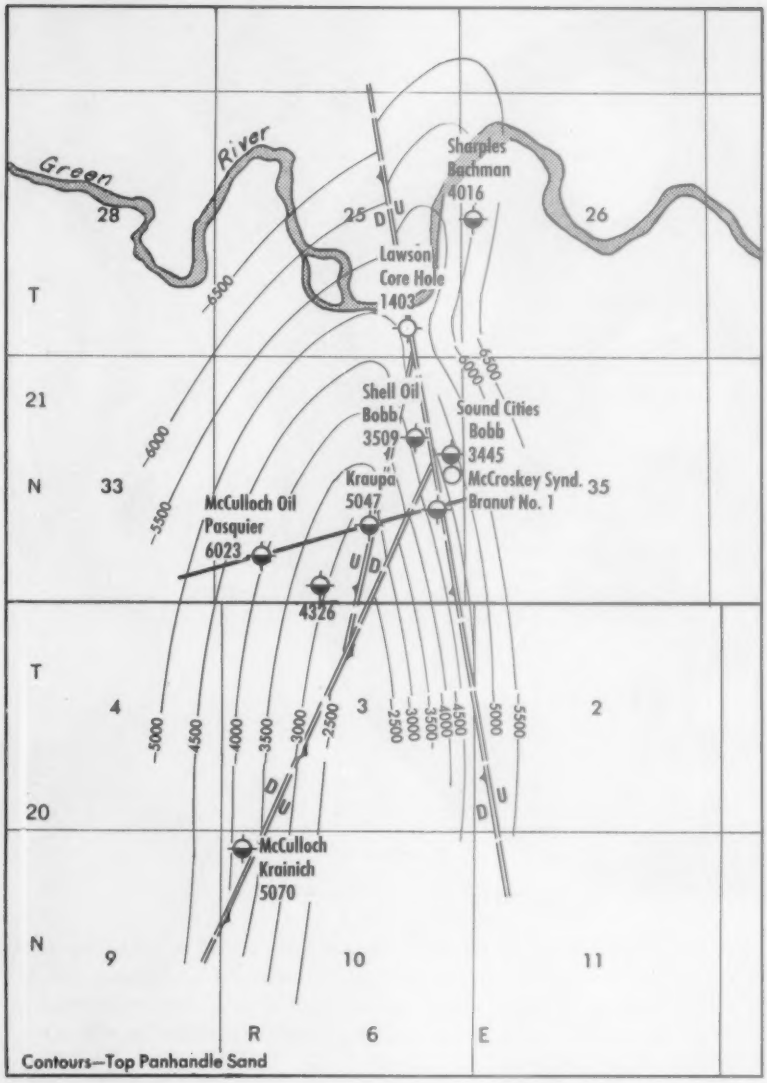

THE LAST THREE previous wildcat attempts were made by the McCulloch Oil Exploration Co. These included the 1 and 2 Pasquier, and the 1 Kranick. This structural contour map shows indicated complex structures. Fig. 3.

the 1 and 2 Pasquier and the 1 Kranick (Fig. 3). All wells found several highly porous and permeable sands with partial oil saturation. Some of the sands tested 3,000 md. of permeability and 35% porosity. The 1 and 2 Pasquier were located on the west flank of the north plunge of the structure. The Kranick located south of the Pasquier wells was an attempt to locate structurally higher to the south, but the Kranick ended up in approximately the same structural position on the anticline.

The Sound Cities Gas & Oil Co. 1 Bobb, frim which the 500 bbl. of oil was reportedly recovered, was drilled from 1937 to 1940. Anderson has summarized the history of this operation. "The well was drilled to 3,440 ft. and 10-in. casing was run to total depth. All promising sand zones were gun-perforated in one operation which resulted in the hole being flooded with water. The operators then placed a packer on the tubing at 3,200 ft. and attempted to pump for production from intervals below 3,200 ft. Pumping yielded several hundred barrels of salt water per day along with a fair volume of gas."

"After pumping water and gas for over a year, the Bobb well started making considerable free oil. The operators then erected a 600-bbl. tank on the property. When completed, the well was flowing oil through the tubing and making considerable sand. The flow was turned into the tank, and when it was approximately two-thirds full of oil, the well 'headed in' with such violence that the tank collapsed. The well abruptly ceased flowing after heading in. Rods, tubing, and packer were pulled and it was discovered that a groove along the side of the

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packer was filled with a limy mineral deposit. This indicated that the original groove permitted water entry from up the hole into the zone below the packer during the long period of pumping. A complete water shutoff had been finally effected by the gradual deposition of lime scale in the groove. This resulted in the brief production of approximately 500 bbl. of oil within a 14-hour period. High pressures had completely clogged the pump with sand, thereby accounting for the abrupt cessation of production. The oil was 24 to 26 gravity."

The Green River district is part of the Eocene Puget basin which includes a thick sequence of essentially nonmarine sandstones, shales, and coal with minor marine shale intercalations. Some 10,000 ft. of sediments have stacked up in measured sections and the deepest well, the McCulloch 1 Pasquier (TD 6,023 ft.), ended up far from the bottom of the section.

Gas shows have been known for years from shallow wells. The Eugene Lawson flaming geyser well (27-21n-6e) is a notable example. Minor, but significant partial oil staining of sands developed not only in the McCulloch wells but in several of the older wells testify that oil has migrated into the sands. Sands of the Puget sequence outcropping in the Green River gorge have been reported by geologists to give up good solvent cuts and good odor.

Big oil find for Ohio

An important oil discovery is reported in Richmond Township, Ashtabula County, northeastern Ohio. Devonian Gas & Oil Co. completed a Medina oil well at 3,762 ft.

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Casing was perforated at 3,762 ft. Hydraulic fracturing brought 130 bbl. of oil through 1/16-in. choke in a 24-hour period. Location is on the Rawley Helton farm on the Starhope-Kellogg Road. Nearest oil production is south of Conneaut in the same county.

Sooner action spreads in every section of state

OKLAHOMA ACTIVITY continues strong in every section of the state.

In western Oklahoma, Pan American Petroleum Corp. is extending Northwest Okeene field in Blaine County at 1 Worley, C SE NW 2-19n-11w. Gas flow from Red Fork Pennsylvanian at 7,210-33 ft., making 1,790 M.c.f.d. with some condensate trace. The field produces from Chester Mississippian. Drilling continues to the Chester zone.

Texas County. Skelly Oil Co. is opening a new deep pool inside the Guymon Hugoton gas field of the Panhandle country. The 2 Hurliman, C NE SW 16-3n-15eCM, flowed 1,147 M.c.f.d. from Morrow Pennsylvanian at 6,559-83 ft.

Beaver County. Dual completion is reported at Mayflo Oil Co. 1-36 Kerns in C NE SW 36-2n-20eCM, north of Northwest Dower field.

The well flowed 6,894 M.c.f.d. from Mississippian perforations at 7,690-7,708 ft. From upper Morrow perforations at 7,212-19 ft., pump got 10 bbl. of oil and 70 bbl. of water per day.

Major County. Livingston Oil Co. has a dual gas well on the north side of Northwest Ringwood field. The 1 Rexroat, NW NW SE 9-22n-11w, flowed 12,800 M.c.f.d. from Cherokee Pennsylvanian perforations at 6,560-75 ft.; from Manning Mississippian at 6,677-94 ft. and 6,701-7 ft., 6,716-29 ft.; the well made 8,600 M.c.f.d.

Harper County. Blackwell Zinc Co. completed a Cherokee lime oil discovery in Northeast Gate Lake field. The 1 Strawn, C SW NE 26-28n-26w, flowed 31 bbl. of oil per hour for 5 hours through 24/64-in. choke from perforations at 6,149-79 ft.

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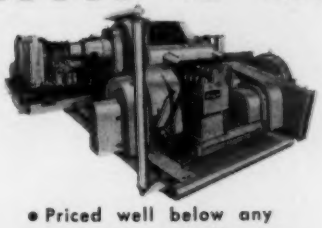
MOGUL "42" RIG



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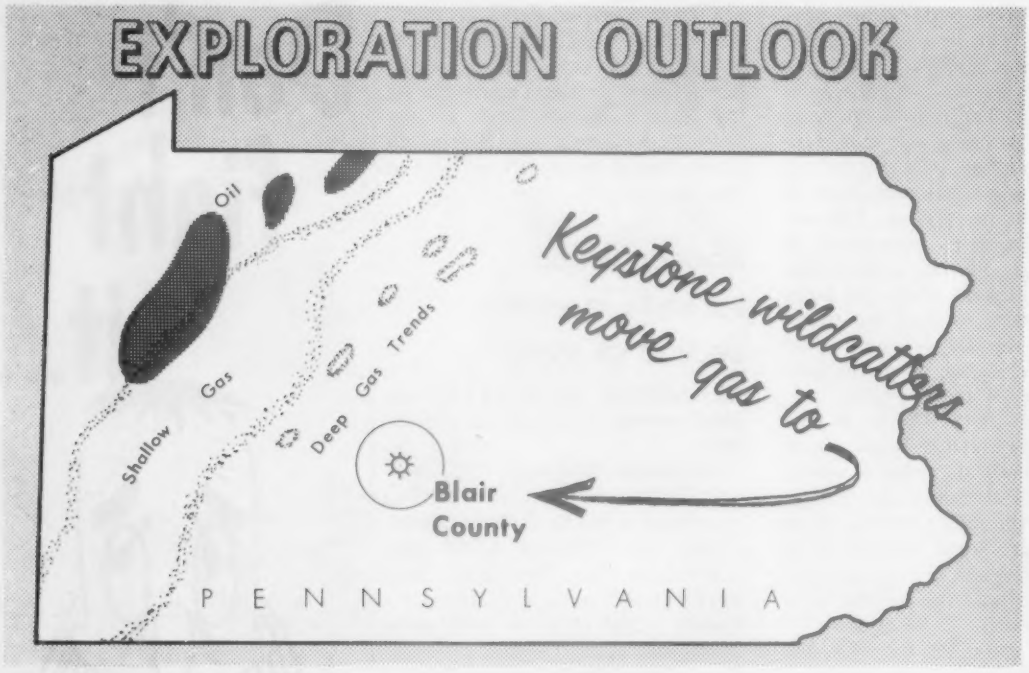

Pennsylvania digs deeper for gas

GAS HUNTERS in Pennsylvania look to 1961 as one of the best deep drilling years yet. This optimism is spiced by a current gas discovery in Blair County and the fast, successful growth of deep gas exploration throughout the Pennsylvanian Appalachian province.

Phillips holds the cards in Keystone State exploration and development this winter. The Bartlesville company just uncovered an important gas reserve in Blair County, 22 miles from other production. Phillips also added its fourth and best well to Ole Bull pool, Leidy field, Potter County.

The Blair County discovery is Pennsylvania Tract 26 A1, Greenfield Township. Location is north of the Schellsbury Dome of Bedford County on a fold en echelon with that dome. The well is 22 miles east of nearest production on the Laurel Hill anticline and 13 miles from previous close drilling. Top of the Devonian Oriskany pay is 6,858 ft. After fracture, the well tested for 1,200 M.c.f.d. This is one of the state's most significant gas finds in some time. Its location so far east of previous producing trends and its 3-mile distance from the Oriskany outcrop point up the possibility of a new gas trend along the eastern side of the Appalachians.

Ole Bull grows as a result of Phillips' fourth and best producer in this Potter County field. Phillips Tract 81 No. 6 well found the Onondaga at 6,414 ft. and the Oriskany at 6,427 ft. Open flow before fracture was 1,540 M.c.f.d., rock pressure 3,860 psi. in 16 hours. After fracture, the well flowed 7,770 M.c.f.d.

Deep gas beckons in several corners of Pennsylvania. In McKean County, Thunderbird Producers Co. 1 Mallory et al., Foster Township wildcat, found the Oriskany at 4,683 ft. Initial open flow was 2,500 M.c.f.d., blowing down to 500 M.c.f.d. with some condensate shows. Other wells recently added to the growing deep gas reserves of the Appalachians include two gassers in Helvetia pool, in Clearfield County's big Punxsutawney-Driftwood field. Production is from the Onondaga chert-Oriskany sandstone interval. Helvetia pool is separated from Rockton pool to the southeast by faulting.

A long 10-mile extension to the northeast was reported on the Laurel Hill anticline's Beck pool in Westmoreland County. Felmont Oil Corp. 1 Stibich found 3,250 M.c.f.d. from Onondaga chert to extend the field.

Each year sees more deep gas wells drilled in Pennsylvania. In 1960 five new deep gas fields were opened plus several important gas extension and stepout strikes. The Blair County discovery may well turn eyes off the Laurel Hill and Chestnut Ridge anticlines to the many folds that lie to the east. Pennsylvania is one of the most promising of the nation's gas provinces. It real worth is just coming to light after a century of nothing but shallow gas tapping. By year's end there should be some new Ole Bulls in the commonwealth.

—John C. McCaslin

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Canadians study new Viking find

VIKING SAND oil production is not new to Alberta. There are many sizable oil fields producing from this section of the Colorado in the central section of the province. However, a discovery in this zone in the southern section does warrant special consideration.

New pool. This new pool discovery, which may or may not develop into a sizable producing area, Texaco Exploration 5-17-20-28 Okotoks, on LSD 5, 17-20-28w4, is 2¾ miles southeast of D1 zone of Devonian gas-producing wells in Okotoks field and about 20 miles southeast of Calgary's city limits, was drilled as a tight hole and its discovery kept under wraps since there were crown-owned lease rights open near the strike. The data on the find became general knowledge with the successful completion of a crown-lease sale at which the discovery operator placed purchasing bids for the lands in question.

Remote find. Closest major Viking oil accumulation to this new strike is Joffre oil field of Central Alberta, about 100 miles due north, while Hamilton Lake oil pool in Central East Alberta is about 150 miles north and east of the new discovery.

At the 5-17 Okotoks discovery, the pay section was 6,196 ft. or 2,778 ft. below sea level, based on kelly-bushing elevation 3,418 ft. Although the operator has not disclosed exact number of feet of pay zone it is understood that about 7 ft. of well-developed oil-bearing Viking sand was encountered at this location. On drill-stem test of the interval 6,155-6,223 ft., with valve open 70 minutes and shut in 15 minutes, gas flow at rate too small to measure was followed by a flow of oil to surface. Flow rate of 35.9° API was gaged at about 30 bbl. per hour. There was no evidence of formation water.

Drilling was completed at the discovery at the 7,440-ft. level with well bore bottomed in the Mississippian (Elkton) zone. This lower section was proved water-loaded by test. Production tests are currently under way to fully evaluate the Viking oil discovery.

High bidder. Texaco Exploration bought a drilling reservation that contains 7,160 acres in the immediate vicinity of the well. At the recent January crown-reserve sale the company was the successful bidder on 280 acres lying 1½ miles southwest of the discovery hole.

Another new development in the area is the drilling of a new exploratory test just 2½ miles southeast of the discovery. This new venture, White Rose et al. 13-3-20-28 Okotoks, on LSD 13, 3-20-28w4, will be operated by Canadian Oil Co., Ltd. Hi-Tower Drilling Co. is contractor on the test and is scheduled to spud the 6,200-ft. test soon. Canadian Oil moves into the play quite legitimately for it, in association with other partners, farmed out the discovery lands to Texaco Exploration Co. Texaco, Canadian Oil, and Security Freehold Petroleum have a direct stake in this discovery.

Geological symposium set for University of Oklahoma

The seventh biennial geological symposium at the University of Oklahoma March 7-8 will be dedicated to the memory of Dr. C. W. (Tommy) Tomlinson, Ardmore consultant geologist and independent oil producer who was a pioneer in the study of geology in southern and southeastern Oklahoma.

Tribute will be paid Tomlinson by Dr. Wlliam D. Pitt, assistant professor of geology at OU, at the first session of the symposium. Tomlinson died last year.

The symposium, which is expected to attract approximately 300 geologists, geological engineers, petroleum engineers, and students, is cosponsored by the OU School of Geology, department of business and industrial services of the OU Extension Division and the Arkansas Geological and Conservation Commission, Little Rock.

Theme of the symposium will be the study of the subsurface geology of the Arkoma basin which has a few gas fields and limited oil production. The Arkoma basin includes the east central portion of Oklahoma and the west central portion of Arkansas.

Registration is scheduled to begin at 8:30 a.m. Tuesday, March 7. Fee is $10 for cost of the published proceedings and admission to the four technical sessions. Registration and the sessions are scheduled for Meacham auditorium in the Oklahoma Memorial Union.

Arkansas opens new Tuscaloosa pay

New Tuscaloosa oil production has been opened in a wildcat about 2 miles northwest of New Garland field, in eastern Miller County, southwestern Arkansas. The discovery has been designated as Moccasin Bayou field. Another test 1,900 ft. northwest failed to produce commercially.

The discovery well was drilled by M. F. McCain and J. E. Marshall as 1 Cabaness. It flowed 66 bbl. of 27.5°-gravity oil daily through 6/64-in. choke with pressure of 435 psi. Gas-oil ratio was 1,660 cu. ft. per bbl. There was no water.

Its Tuscaloosa pay is perforated at 2,827-30 ft. Hole was through the Tuscaloosa formation into the Lower Cretaceous. Total depth is 3,310 ft.

The other test, drilled almost simultaneously by W. C. Gibson and W. A. G. Woodward, was quit at 3,011 ft. It had shows of heavy oil in the upper part of sand at 2,814 ft.

The area is about 3 miles northwest of the town of Garland City.

Douglas gas pay opened in Texas Panhandle field

Douglas Pennsylvanian sand gas production was opened at a wildcat in north-central Lipscomb County, Texas Panhandle. Discovery well is Ambassador Oil Corp. 1 Max A. Blau, 8 miles southeast of Booker in Section 941, Block 43, H&TC Survey, 3 miles west of Kiowa Creek field.

The well flowed 5,402 M.c.f.d. through ¾-in. choke from perforations at 5,890-5,903 ft.

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& Gas Co. completed 1 Samuel McLain as a Cleveland Pennsylvanian sand new-pay discovery in North Buler field. The well flowed 187 bbl. of oil daily on ¾-in. choke from perforations at 7,114-36 ft. Location is 15 miles south of Perryton in Section 95, Block 13, T&NO Survey, 1 mile southeast of Morrow gas production.

North Texas gets first quadruple oil-gas well

The first quadruple oil-gas well in North Texas is being completed by Jade Oil Co. and Christie, Mitchell, & Mitchell.

The well is Methodist Camp 1; located in Wise County, Texas, and currently is on test, Mitchell said. Jade Oil has a 32½% interest in the well, with Christie, Mitchell, & Mitchell owning the remaining interest.

The oil completion penetrated the Atoka zone and is on test at 5,414-34 feet. One of the gas completions was also in the Atoka zone and is on test 5,270-80 ft. The other two gas completions are in the Strawn zone at 4,220-32 and 4,000-30 ft. respectively.

Big well completed in White County, Illinois

A fine well was completed in White County, Illinois, by Dee Drilling Co. 1 Lamar-Williams, 3 miles west of Crossville, Ill., in SE NE NW 29-4s-10e. It flowed 585 bbl. of oil per day from O'Hara Mississippian at 3,129-48 ft. after acid treatment.

This well has made over 9,500 bbl. of oil in 3 weeks, and is still flowing 300 bbl. daily. The 2 Lamar-Williams in NE NE NW 29-4s-10e, the north offset to the new discovery, flowed 10 bbl. per hour, natural, from O'Hara at 3,131-47 ft.

New triple-zone well for South Mississippi

Completion of a new triple-zone gas well is reported by Skelly Oil Co. in South Mississippi's multiple-pay Dexter field, on the Walthall-Marion county line.

So far as its two Lower Cretaceous zones are concerned, the well is one of the best so far completed from those somewhat erratic zones in this field.

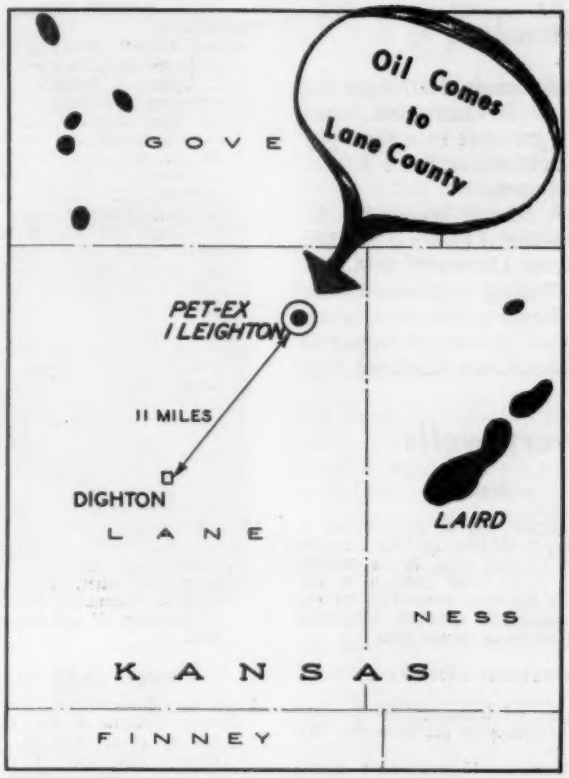
From these zones, one at 10,952-87 ft., and the other at 10,828-73 ft., the well (1-C Pittman) flowed 1,600 M.c.f. and 2,700 M.c.f.d. of gas, respectively, through 12/64-in. chokes. Gas from the lower zone carried ½ bbl. of condensate per day. Flowing pressure was 2,800 psi. Gas from the other zone was dry, and flowed under pressure of 3,600 psi.

The well's third zone, perforated at 9,574-9,601 ft., is in the field's lower Tuscaloosa sand of Upper Cretaceous age. Flow from this pay was dry gas at the daily rate of 2 M.M.c.f.d., also through 12/64-in. choke.

A total of 217 ft. of net gas sand was logged in the Lower Cretaceous, The lower Tuscaloosa had 9 ft. Total depth of the hole is 11,230 ft.

Gas discoveries added to Arkoma basin

Oklahoma's Arkoma basin continues to record important new gas discoveries. Midwest Oil Corp. completed 1 Morris in LeFlore County, SW NE 12-8n-26e, flowing 2 M.M.c.f.d. from perforations at 5,205-15, 5,221-27, 5,245-51, and 5,256-62 ft. The discovery flowed



A ONCE-PRODUCTIVE COUNTY in Kansas' Dodge City basin is back on the oil list.

Kansas' Lane has oil production again

A REMOTE discovery in western Kansas is ready for completion. It is Pet-Ex 1 Leighton in C SW NE 28-16s-27w, 12 miles from production and 11 miles northeast of Dighton in Lane County.

Operator has cemented production pipe for completion tests at a Lansing-Kansas City Pennsylvanian oil prospect in the northeastern part of Lane County. Recovery on drill-stem tests got oil from that zone. Nearest production is to the east in Ness County. Nearest comparable pay is 14 miles away at North Fork field.

1 M.M.c.f.d. on 22/64-in. choke from these openings.

McIntosh County. Hall-Jones Oil Corp. and W. B. Cleary, Inc., completed one gas zone in a three-pay discovery in Southeast Raiford field, McIntosh County.

The 1-A Minnie Wood, SE SE NE 17-9n-15e, flowed 20,162 M.c.f.d. from Cromwell at 4,290-4,316 ft. Testing continues in the Hunton Misener section. This is one of the biggest gassers yet tapped in the current Arkoma campaign.

Discovery wells

ARKANSAS

Miller County:

M. F. McCain and J. E. Marshall 1 Cabaness, 1-16s-26w, 2¾ miles northwest of Garland City. IP 66 BOPD, 6/64-in., 27.5°, GOR 1,660 cu. ft. per bbl., TP 435 psi., perf. 2,827-30 ft., Tuscaloosa. TD 3,310 ft. Discovery well of Moccasin Bayou field.

WESTERN CANADA

Alberta:

Mobil et al. 6-5 Brazeau, LSD 6, 5-45-13w5. Mississippian gas discovery. TD 10,252 ft.

British-American 11-1 Lookout Butte, LSD 11, 1-2-29w4. Mississippian gas discovery. TD 13,220 ft.

Saskatchewan:

Homestead et al. 6-18 Hatton, LSD 6, 18-12-27w3. Medicine Hat gas discovery. TD 1,772 ft.

COLORADO

Morgan County:

HLM Drilling Co. et al. 1-C Doheny-Schroeder, OWWO, C NE SE 7-2n-57w. IPP 120 BOPD, cut 25% water, "D" sand 5,491-96 ft. TD 5,620 ft. "D" sand discovery, new field.

MONTANA

Liberty County, Bears Den field:

Cabeen Exploration Co. 1 Lang, C NE SE 7-36n-6e. IPP 85 BOPD, 38°, GOR 115:1, Swift discovery, new pay. TD 2,525 ft.

NORTH DAKOTA

McKenzie County, Bear Den field:

Amerada Petroleum Corp. 3 Bear Den unit, NE NE 36-149n-96w. IPF 172 BOPD, 23 b.s. and w. in 18¾ hours, ¾-in. choke, TP 150 psi. Duperow 11,284-11,314 ft. TD 11,410 ft. Devonian discovery, new pay.

EAST TEXAS

Henderson County:

Fairway Operating Co. 1-B Olga Lupkin, B. H. Bizzell Sur., A-964, 3 miles northwest of Frankston. IP 535 BOPD, 12/64-in., 47°, GOR 1,150 cu. ft. per bbl., TP 2,390 psi., perf. 10,119-36 ft., James line. TD 10,281 ft. Discovery well of West Frankston field.

Rusk County:

Amigos Oil & Gas Ventures 1 M. Duran, C. M. Gould Sur., A-32, 5 miles north of Pinehill. IP 85 BOPD, 17/64-in., 40°, GOR 1,250 cu. ft. per bbl., TP 450 psi., perf. 6,895-98 ft., Pettet. TD 7,308 ft. Discovery well of Cal Noble field.

NORTH TEXAS

Wise County:

Morris 4,500-ft. Strawn field and 5,500-ft. Atoka conglomerate field. Chestern R. Upham 1 William Orr, 5½ miles northwest of Bridgeport in O. N. Metcalf Sur. A-1234. IPF 164 BOPD, 15/64-in. choke, 41.7°, GOR 960:1, TP 250 psi., CP psi. 4,500 ft., Strawn sand 4,513-4,601 ft.; IPF 148 BOPD, 15/64-in. choke, 42.5°, GOR 1,180:1, TP 300 psi., packer. Atoka conglomerate 5,496-5,512 ft.; IPF 172 BOPD, 14/64-in. choke, 40.8°, GOR 1,050:1, TP 400 psi., packer. Atoka conglomerate 5,898-5,909 ft. TD 5,968 ft. Triple oil, dual discovery.

Young County:

Gulf Oil Corp. 1 R. H. Stewart, Jr. et al. unit, 2½ miles southeast of Beth Bend congl. field. A. T. Meadows Sur., A-1491. IPAOF 20 M.M.c.f.d., Bend conglomerate 4,255-62 ft. TD 4,723 ft. SITP 1,606 psi., 68°, GLR 399,000:1. TD 4,723 ft. Gas-condensate discovery.

SOUTHWEST TEXAS

Webb County:

Solo Oil Co. 1 Laurel Estate, Sur. 333, 3 miles north of Oilton. IPP 36 BOPD (net), 29% water, 37.8°, perf. 2,512-17 ft. upper Tosenberg. TD 2,866 ft. New oil reservoir off east side of old Laurel field.

TEXAS GULF COAST

Chambers County:

Draper, Goodale & Co., Inc., 1 T. H. McCoy et al., Lot 48, Theodore F. Koch & Co. Subd., F. Valmore Sur., A-26, 2 miles northeast of Winnie. AOF 11,500 M.c.f.d., GLR 51 M.c.f. per bbl., 64.8°, shut-in TP 3,115 psi., perf. 8,532-40 ft., Nodosaria. TD 8,800 ft. New pay in North Winnie field.

DeWitt County:

Texas Eastern Transmission Corp. 1 Herman A. Garbe, Robert Galletty Sur., A-195, 5½ miles east of Runge. AOF 8,600 M.c.f.d., GLR 568 M.c.f. per bbl., 54.9°, shut-in TP 4,117 psi., perf. 13,-881-13,910 ft., Edwards lime. TD 14,841 ft. Opens new deep Edwards field. (Completed but not gaged September 14, 1960.)

Galveston County:

Texaco Inc., 1 Orchard Oil unit 1 O/A, Lot 39, Algoa Orchard Subd., G&BN Co. Sur. 2, A-76, 2 miles southwest of Arcadia. IP 230.43 BOPD, 10/64-in., 37.7°, GOR 305 cu. ft. per bbl., TP 230 psi., perf. 8,880-84 ft., Frio. TD 12,369 ft. Discovery well of Algoa-Orchard field.

Matagorda County:

J. M. Flaitz and R. B. Mitchell 2 W. B. Ferguson, Jr., Joseph Clements Sur., A-135, 8½ miles southeast of Bay City and 2 miles northeast of Wadsworth field. IP 254.20 BOPD, 10/64-in., 37.4°, GOR 917 cu. ft. per bbl., TP 1,375 psi., perf. 10,460-480 ft., Frio-Lewis sand. TD 10,600 ft. New pay in Caney field.

WEST CENTRAL TEXAS

Haskell County:

Prorated in Regular field. Megargel Drilling Co. et al. 1-B E. M. Bunkley, 7 miles south of Haskell in Sec. 87, H&TC Sur. IPP 35 BOPD, plus 10% water, 39.2°, open hole 2,318 ft., King sand, GOR 100:1. TD 2,323 ft. New oil discovery.

Jones County:

Dalton Moore Eng. Co. 1 Marguerite Goode, new oil discovery, prorated in Regular field, 2 miles southeast of Noodle in Sec. 43, Blk. 18, T&P Sur. IPF 85 BOPD, plus 30% water, 43°, GOR 1,397:1, CP packer, TP 160 psi. TD 3,119 ft. New oil discovery.

Prorated in Regular field. Copaz Oil & Gas Corp. 1 E. S. Brady, 1 mile northwest of Hamby in Sec. 12, BAL Sur. IPF 288 BOPD, 18/64-in. choke, 38.6°, GOR 650:1, CP 450 psi., TP 225 psi., Tannehill sand 1,649-53, 1,659-63 ft. TD 1,720 ft. New oil discovery.

Palo Pinto County:

Fletcher Oil & Gas Drilling Corp. 1 C. E. Allen, dual completion, 4 miles north of Gordson in John Bird Sur. IPCAOF 690 M.c.f.d., 3,441-45 ft.; IPCAOF 2,150 M.c.f.d., Big Saline 3,213-19 ft. TD 3,820 ft. New gas discovery.

Stephens County:

Harding Brothers 1 L. O. Cunningham, Dual completion, 2 miles southeast of Eliasville in Sec. 1210, TE&L Sur. IPP 36 BOPD, plus 10% water, 39°, comp. in Sugg Harbros field. Upper Caddo 3,268½-71½ ft. TD 4,267 ft. New oil discovery.

Taylor County:

Humble Oil & Refining Co. 1-B Grady Parmelly, dual completion, 3½ miles southwest of View in Sec. 6, Blk. 2, SPRR Sur. IPF 171 BOPD, 16/64-in. choke, 44.5°, GOR 267:1, packer, TP 80 psi. lower Flippen sand 2,929-39 ft. TD 4,970 ft. New oil discovery.

Taylor County, prorated in Regular field:

Sojourner Drilling Corp. 2 Hortense Calvert, 7 miles northwest of Bradshaw in Sec. 130, Blk. 64, H&TC Survey. IPF 58 BOPD, 16/64-in. choke, 40°, GOR 100:1, packer, TP 55 psi. Fry sand 4,432½-36½ ft. TD 5,066 ft. New oil discovery.

WEST TEXAS

Reeves County.

Sinclair Oil & Gas Co. 1 O. J. Green, 10 miles south of Pyote in Sec. 27, Blk. C-3, PSL Sur. IPF 196 BOPD, plus 21% water, ¼-in. choke, 4,948-60 ft. TD 5,036 ft. PBTD 5,007 ft. New oil discovery. 36.5°, GOR 595:1, TP 440 psi. CP 375 psi. Texas Crude Oil Co. psi. CP 375 psi.

Texas Crude Oil Co. 1-2 L. W. Curry, 12 miles east of Pecos, Sec. 2, Blk. 7, H&GN Sur. IPF 414 BOPD. 16/64-in. choke, 26.2°. GOR 425:1. TP 150 psi. packer.

Scurry County:

Pembrook & Liedtke 1 Hataway, 7 miles south of Fluvanna in Sec. 327, Blk. 97, H&TC Sur. IPF 184 BOPD, 18/64-in. choke, 40°, GOR 836:1, TP 110 psi. Strawn 7,704-8 ft. TD 8,343 ft. PBTD 7,732 ft. New oil discovery.

UTAH

Uintah County:

Belco Petroleum Corp. 3 White River, OWWO, C NW NW 25-8s-22e. IPF 1,250 M.c.f.d., 2-in. tubing, CP 1,820 psi., TP 1,820 psi. Wasatch 6,422-32 ft. TD 10,863 ft. Wasatch discovery, new field.

WYOMING

Natrona County:

Wallace Creek area. National Cooperative Refinery Association 1 Unit, SE NW 22-34n-87w. IPF 80 BOPD 1,400 M.c.f.d., Muddy discovery, new field. TD 10,543 ft. Muddy 10,345-61 ft.

Weston County:

Oil City Supply Co. 1 Wyoming Farm, NE NW 32-45n-61w. IPP 2½ BOPD, Newcastle 478-499 ft. TD 680 ft. Newcastle discovery, new field.

Jean Guyot . . . Lacq gas created Entrepose.

French Pipeliner Stays Busy

. . . at helm of fast-growing firm. And Jean Guyot expects new projects in France and Africa to keep things humming.

A NAME which is growing more important daily in foreign pipeline work is Ste. Entrepose, the French pipeline-construction firm.

And much of this Paris-based company's success can be credited to Jean Guyot, a graying Frenchman with a quick smile who serves as managing director of Entrepose.

Guyot is a mining engineer who, like his company, has grown up with the pipeline business in France. And when you discuss Entrepose with him, he is quick to point out that "all that we know has come from the American contractors."

"We started out with American equipment and methods," he says in tracing the history of his company. "We were babies in the business at that time."

That was in 1950. Today, this baby has grown into a healthy 11-year-old which is competing with American and other contractors for jobs throughout the Middle East, North Africa, and Europe.

The beginning . . . Guyot traces the beginning of his pipeline career and the birth of his company to the 1950 discovery of gas in France.

A pipeline was needed to move the gas to market, so Entrepose was organized and Guyot became a pipeliner.

The pipeline-contracting firm, like some other French contracting companies, is owned by steel plants—two of them, in the case of Entrepose.

As the number of pipelines increased in France, so did the size of Entrepose. The company laid a high-pressure coal-gas line in France, then a product line, and handled 2,000 miles of mainline and gathering lines for Gaz de France to move gas from the Lacq area in southwestern France to several of the country's major cities.

Guyot went to French Morocco in 1954 to help direct the company's first project outside France. The company had a contract for off-base work in connection with a U. S. Air Force base.

Next he was assigned as resident manager in Iran, where Entrepose laid a 140-mile 10-in. gas line from Gach Saran to Shiraz and had part of a contract for a 12-in. products line from Abadan to Teheran.

Guyot made his first visit to the U. S. in 1957 while he was assigned to Iran. He has visited the country several times since then, most recently to attend the annual meeting of the Pipe Line Contractors Association in San Francisco last month.

His association with Americans dates back to his World War II days, long before he knew he would be in the pipeline business. He had a lot of dealings with the Allies while serving as an underground agent for the Free French Press.

The future . . . Entrepose and Guyot are looking for busy days ahead as new pipelines are planned in France and North Africa.

Guyot also has had some connection with plans for a gas line to span the Mediterranean. The company welded a 3-mile section of 8-in. pipe for one of the surveys being made to find ways of crossing the sea.

One route getting serious attention is a proposed crossing near Oran, where the jump to Europe is about 140 miles. But the 9,000-ft. depth is the big drawback in this plan.

Guyot says research shows you can lay the line on the bottom satisfactorily, but the problem is "picking it up" for repairs or maintenance.

●

Lewis C. Holder has joined Trunkline Gas Co. as Houston district land man. He had been with Humble Oil & Refining Co. and more recently was an independent operator.

William M. Carter, assistant vice president of Valvoline Oil Co., has been elected vice president and general manager of the foreign division. He succeeds **Ben H. Morris,** who will continue as a vice president and consultant.

A. G. Pollard, superintendent of Tennessee Oil Refining Co.'s Chalmette, La., refinery, has been named refinery manager. **C. H. Kilgore,** operating superintendent, will succeed Pollard. **R. L. Hanle,** manager of Chalmette laboratory and blending operations, has been named head of the refinery's new products division.

Personals

Donald I. Lawless, vice president of Canadian Bishop Oil, Ltd., has been elected president of Bishop Oil Co., San Francisco, the parent company. He succeeds **Louis J. Brunel,** who will continue as a director and consultant. Lawless will also succeed Brunel as president of Canadian Bishop. Lawless was manager of exploration for Canadian Bishop before being named Mid-Continent division manager for the parent company in 1954. He returned to Canada 3 years ago as vice president of Canadian Bishop.

LAWLESS

Paul L. Kelly, Bismarck, N.D., division exploration manager for Calvert Petroleum Co., Tulsa, has opened offices in Bismarck as consulting geologist and independent operator.

Mason L. Hill, manager of exploration for Richfield Oil Corp., has been elected president of American Association of Petroleum Geologists. He succeeds **Ben H. Parker,** Frontier Refining Co., who will serve on the executive committee. Other officers are **J. Ben Carsey,** Humble Oil & Refining Co., vice president; **George V. Cohee,** U.S.G.S., secretary-treasurer; and **Grover E. Murray,** Louisiana State University professor, editor.

S. A. Hallberg, manager of American Oil Co.'s Chicago pipeline division, has been named general superintendent, product movement. He succeeds **J. R. Polston,** who has been transferred to Standard Oil Co. (Ind.), the parent company.

C. D. Richardson, assistant superintendent of Transcontinental Gas Pipe Line Corp.'s pipeline department, has been named superintendent of the new Pennsylvania storage department. Also assigned to the new department in Williamsport, Pa., will be **Robert M. Detamore,** compressor division engineer in Charlottesville, Va.; **John S. Noel,** pipeline district superintendent in Trucksville, Pa.; **W. L. Summers, Jr.,** compressor station repair foreman in Delta, Pa.; and **Fred Lydic,** West Chester, Pa., corrosion engineer.

A. L. Lundberg has been named general superintendent, domestic, for O. R. Burden Construction Corp. **M. T. Wilhite** is general superintendent, foreign.

Howard C. Pyle, president of Monterey Oil Co., Los Angeles, has been named a director of Transwestern Pipeline Co., Houston. Monterey recently agreed to sell its 15.8% interest in Transwestern to Northern Natural Gas Co.

H. W. Witter, assistant to the manager of West Coast pipelines for Mobil Oil Co., has been appointed manager of operations. Pipeline operations have been organized under six geographical areas with **R. E. Dafoe, C. A. McDonald, J. W. Hazzard, G. F. Pitzer, A. W. Lemberger,** and **C. A. Rhoton** as area supervisors. **J. B. Goza,** Houston division engineer for Magnolia Pipe Line Co., has been appointed manager of engineering for Mobil's West Coast pipelines. **W. C. Meek,** supervisor of right-of-ways, surveying and mapping, has been named manager, rights-of-ways and claims. **W. H. Webb** has been named manager of oil movements. **C. D. Grant** is administrative assistant to **J. S. Black,** manager of West Coast pipelines, and **D. P. Dowling** is manager of employe relations, West Coast pipelines.

A. E. Meissner, district manager in Corpus Christi, Tex., for Sunray Mid-Continent Oil Co., has been named western division production manager in Denver. He succeeds **O. A. Graybeal,** recently named administrative assistant to the senior vice president, production, in Tulsa.

Alton P. Hynes, manager of Shell Oil Co.'s Honolulu marketing division, has been named assistant to the general manager in the New York marketing department. **D. C. Ross,** southern division sales manager in New Orleans, will succeed Hynes. **C. D. Byers,** New Orleans district manager, will succeed Ross.

Thomas E. McDowell, chief engineer with An-Son Drilling Co., has joined Ste. Languedocienne de Forages Petroliers, 25-rig French contract drilling firm, as coordinator of foreign contracts and operations. He will headquarter in Paris. McDowell had been with Arabian American Oil Co., Ecopetrol in Colombia and Hunt Drilling in Pakistan before joining An-Son.

John M. Greene, production geologist with Shell Oil Co., has been transferred to Midland, Tex., from Houston.

Guy C. Ellison, senior geologist for Sunray Mid-Continent Oil Co.'s Lafayette, La., district, has been promoted to district geologist.

James R. Marshall, district engineer for Phillips Petroleum Co. in Mata Grande, Venezuela, has been named production engineer in Alvin, Tex.

C. H. Markley, senior assistant division manager in Phillips Petroleum Co.'s Chicago sales division, has been promoted to manager of operations in the Bartlesville, Okla., headquarters sales department. **J. M. Nelms,** marketing assistant in St. Louis, has been named assistant division manager in Chicago. In the production department, **M. E. Michael** has been named western Kansas district superintendent in Great Bend, Kans., and **A. J. Willis** has been named Morgan City, La., district superintendent.

Robert E. Lenz, assistant director of engineering in Monsanto Chemical Co.'s research and engineering division, St. Louis, has been named director of engineering for the Chocolate Bayou petrochemical plant to be built near Alvin, Tex. Others assigned to the project are **Robert H. Kittner,** as director of market research and sales development; **Joseph Cresce,** director of manufacturing; and **Carl E. Pfeifer,** director of project services. **H. K. Eckert** was named project general manager last month.

Personals

Dr. William E. Kennel, manager of research for Amoco Chemicals Corp., has been elected a director.

Richard S. Rector, senior staff geologist for Mobil Oil Co. in Midland, Tex., has been promoted to Houston district geologist.

George E. Farmar, production manager for Consolidated Oil & Gas, Inc., Denver, has been appointed chief engineer.

W. A. Maley has joined Humble Oil & Refining Co.'s headquarters staff as assistant to the vice president for exploration. He had been manager of the exploration department, Humble division.

Wallace E. Avery, secretary of Texaco Inc., has been named vice president in charge of the company's West Coast operations with headquarters in Los Angeles. The appointment is effective May 1. **Maury L. Nee** will succeed Avery.

MENDENHALL

W. R. Mendenhall, assistant manager of crude-oil, natural-gas, and plant-product sales for California Co. division of California Oil Co., has been named manager of crude-oil and plant-product sales. **W. E. Gibson,** staff and administrative assistant, has been named Calco sales representative, natural gas.

George B. Parks, vice president of production and drilling operations for Kerr-McGee Oil Industries, Inc., has been appointed vice president in charge of all oil and gas exploration. Domestic and foreign exploration have been consolidated into one department. **J. C. Finley,** vice president, will assist Parks with management of the new department. Also, **Harold J. Kleen,** has been named geological adviser to the president, a new post. **Breene M. Kerr** has been named manager of the land department and **J. Val Connell** has been named assistant to the president. **John A. Masters** will continue as chief geologist. In the production department, **Charles F. Miller,** manager of foreign drilling and production, has been named general manager of production, both foreign and domestic. In the drilling department, **Grier D. Zimmerman,** manager of operations in Argentina and Bolivia, has been named general manager of foreign and domestic drilling. **Paul D. Romano** will succeed Zimmerman. **G. Otis Danielson** continues as manager of drilling operations and also becomes assistant to the general manager. **Leo P. LeBron** has been named manager of foreign drilling. **Norman Baxendale** will continue as Mid-Continent and Rocky Mountain regional drilling superintendent. **Joe E. Tracy** has been named superintendent of drilling and marine operations in Maracaibo.

John R. Branch, geologist with Shell Oil Co., has been transferred to Jackson, Miss., from Shreveport, La.

Ronald D. Nelson has been named assistant to the senior vice president of world-wide sales of Texaco Inc. Nelson has been manager of Texaco (Trinidad) Ltd., and Texaco Antilles, Ltd., marketing subsidiaries of Texaco in the eastern Caribbean area.

J. Byron Brown, general manager of Mediterranean Refining Co.'s Sidon, Lebanon, refinery, has been named manager of manufacturing and operations for Caltex Petroleum Mij. (Nederland) N.V., in The Hague. **J. E. Creecy,** manager of the Caltex S.A.F. refinery near Bordeaux, France, will succeed Brown in Sidon.

Dr. Harry J. Werner, research group supervisor in Pan American Petroleum Corp.'s geological-research division, has been promoted to research section supervisor. **Dr. Aureal T. Cross,** technical-group supervisor, has been named research group supervisor. **Dr. Gerald M. Friedman** has been named research associate. Also, **Dr. William M. Sackett** has been appointed technical-group supervisor in the inorganic-chemistry group; **Dr. Robert R. Thompson** has been named technical-group supervisor, organic chemistry; and **Dr. James M. Forgotson, Jr.,** has been named technical-group supervisor, stratigraphy and data processing.

Paul H. Temple has been named president of Esso Iberia, Inc., Spanish exploration affiliate of Standard Oil Co. (N. J.), and president of Esso Standard Espanola, S.A., Jersey's Spanish marketing affiliate. Temple had been assistant manager of the negotiations division of Jersey's producing-coordination department.

C. C. Coffee, Jr., foreman with Mobil Oil Co. in Johnsons Bayou, La., has been transferred to DeRidder, La., in the same capacity.

R. C. Barton, production engineer with Humble Oil & Refining Co., has been transferred to Monahans, Tex., from Midland, Tex.

James R. Crow is president and geologist of Petroleum Operations, Inc., new consulting firm in New Orleans. **Pierre Geautreaux** is vice president and petroleum engineer.

Frank M. Allen, district superintendent in Wichita Falls, Tex., for Cities Service Petroleum Co., has been transferred to Blackwell, Okla., as plant superintendent.

E. G. Hoover, marketing operations manager for Continental Oil Co.'s southwestern region, has been promoted to manager of marketing in the Fort Worth division. He succeeds **G. W. Brown,** now sales development manager, southwestern region. Both will headquarter in Fort Worth.

Frank W. Harrison, Jr., consultant, has been elected president of the Lafayette, La., Geological Society. Other new officers are **Jay Howell,** Petroleum, Inc., vice president; **Stuart Hastings,** Phillips Petroleum Co., secretary.; and **D. C. Archer,** W.W.F. Oil Corp., treasurer. Executive committee members include **S. A. Spencer,** Phillips Petroleum Co., past president; **James W. Sheller,** State Exploration Co.; and **C. E. Whipp,** Trunkline Gas Co.

Personals

E. S. Arnold, assistant production superintendent for Phillips Petroleum Co. in Calgary, has been transferred to Cut Bank, Mont., as assistant superintendent.

Dr. William S. Hoffmeister, head of micropaleontological work for Jersey Production Research Co. in Tulsa, has retired after 34 years with the Jersey Standard companies.

Dr. Hans Schindler, production manager of Sonneborn Chemical & Refining Corp.'s Petrolia, Pa., refinery, has been elected a vice president of Sonneborn. **A. J. Bevevino** has been named assistant manager of the Petrolia refinery.

L. Millard Gelvin, assistant treasurer of DX Sunray Oil Co., has been named assistant to the president of Sunray Mid-Continent Oil Co.

Harry Dernick, Calgary independent operator and consultant, has joined Camerina Petroleum Corp. as general manager of Canadian operations. He will headquarter in Calgary.

Carl E. Reistle, Jr., executive vice president of Humble Oil & Refining Co., has been elected to honorary membership in American Institute of Mining, Metallurgical, and Petroleum Engineers. Reistle is a past president of AIME.

Leslie L. Greenfield, geologist with Monsanto Chemical Co.'s Lion Oil Co. division, has been promoted to district geologist in Houston.

Louis F. Goss, geologist for Texaco Inc. in Lafayette, La., has been transferred to New Orleans as staff geologist.

D. J. Losher, district engineer for Felmont Oil Corp. in Borger, Tex., has joined Cabot Corp. as staff petroleum engineer in Pampa, Tex.

Wayne H. Walker, manager, administrative, and a director of Pan American International Oil Corp., has been elected vice president, administrative.

Edward J. Steinmetz has been named assistant director of Ashland Oil & Refining Co.'s management-engineering department. He will continue as manager of Ashland's methods and procedures section.

C. E. Nichols, production foreman for Amerada Petroleum Corp. in Charlson, N. D., has been transferred to Tioga, N. D., in the same capacity.

Edwin E. Larson, geologist with Humble Oil & Refining Co., has been transferred to Los Angeles from Eugene, Ore.

D. E. Hutton has succeeded **E. A. Skarda** as manager of Neutral Zone operations for Getty Oil Co. **George Padgett** will be chief engineer, Neutral Zone.

ROGERS

William J. Rogers, assistant chief petroleum engineer for Sinclair Oil & Gas Co. in Tulsa, has been promoted to chief petroleum engineer, production department. He succeeds **Lloyd Holsapple,** recently named manager of the unitization and part-interest department.

James V. C. Malcolmson, general manager of the marine department of Texaco Inc., has been elected a vice president of the company.

John W. Sanders, geologist with American Overseas Petroleum, Ltd., has been transferred to New York from Tripoli, Libya.

D. E. Howard, district petroleum engineer for Texaco Inc., has been transferred to Wichita Falls, Tex., from Shreveport, La.

James Kirker, Western Decalta Petroleums Ltd., Calgary, has been elected president of Alberta Society of Petroleum Geologists.

John A. McCone, chairman of Joshua Hendry Corp., Los Angeles, and chairman of the Atomic Energy Commission during the Eisenhower administration, has been elected a director of Standard Oil Co. of California.

Deaths

Lewis Finch, Jr., 45, manager of production for Pan American Petroleum Corp., died January 26 in a Rochester, Minn., hospital from complications following surgery. Finch was chief engineer in the producing department before becoming production manager last year. He had been with Pan Am since 1937.

Ernest C. Haynes, 60, president of Wel-Kemp Corp., Houston, and independent oil operator in the area for 40 years, died January 28 in a Houston hospital.

Arch M. Bowman, 87, retired Tulsa oil-field equipment firm operator, died January 26 at his home in Tulsa. Bowman had been with Gulf Oil Corp. and Humble Oil & Refining Co. before setting up his equipment firm in Tulsa.

Paul C. Scullin, 87, retired vice president of refining for Texaco Inc., died January 27 in a Houston hospital after a long illness. He had been retired since 1939.

S. A. Montgomery, 64, vice president and a director of Standard Oil Co. (Ind.), died January 24 in a Chicago hospital.

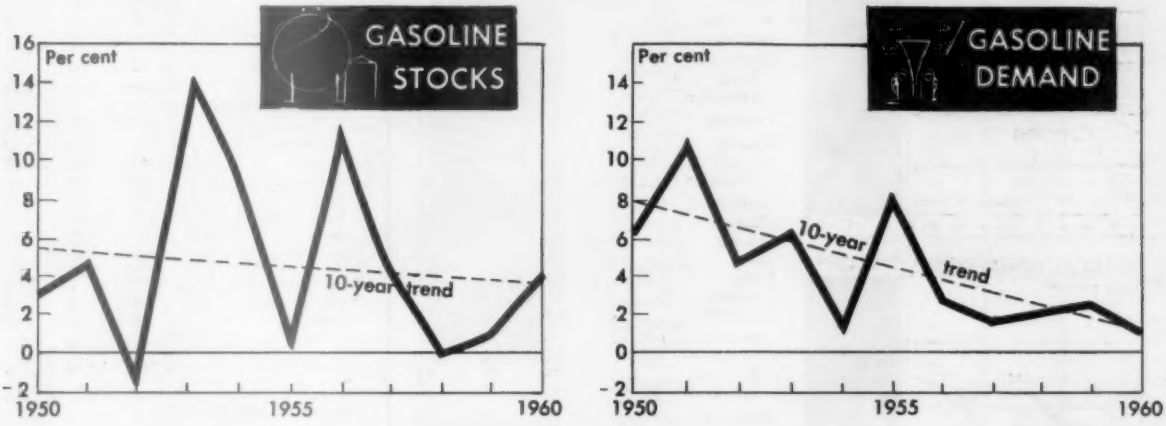
Frank Gladstone Hall, 67, retired vice president of Imperial Oil, Ltd., died January 19 while on vacation in Florida. Hall served Imperial as general sales manager and a director before becoming a vice president. He retired in 1955.

John Hall Grubb, 55, vice president and manager of the international division of Cameron Iron Works, Inc., died January 25 in a Houston hospital after several months illness.

Charles J. Reller, 57, secretary and treasurer of Atlantic Refining Co., died January 28 at his home in Hartsville, Pa., after a heart attack.

Charles C. Zimmerman, 55, president of Keystone Exploration Co., Houston, died February 1 in Houston.

Annual percentage increases in . . . .



Take a closer look at gasoline stocks

BY JOHN C. CASPER

GASOLINE DEMAND increased only about 1.34% last year, but refiners boosted average inventories for the year by 4.15%.

Annual increases in total gasoline demand have been shrinking over the past 11 years. The largest percentage gain for the 11-year period was in 1951 when total gasoline demand for the year was up 11.10%.

Note from the right chart that the two peak-gain years, 1951 and 1955, were followed by much smaller increases. Also, 1955 was the last year with an increase above 3%.

The calculated trend for the 11-year period shows a drop from a little better than 8% at the start of the period down to about 1% last year. This shows that percentage gains have tended to grow smaller with the reduction averaging about 0.7% a year.

If this same average rate of slowdown were to continue for another 2 years, gasoline demand would start showing losses rather than gains. Except for the disturbed years during World War II, there has not been a decrease in gasoline demand since 1933.

Follow the year-to-year line since 1956. A trend seems to be developing with annual gains near 2%. Larger gains are expected for the years 1952 and 1953, but there is nothing to indicate a return to the 6% increases that were normal for past years.

Refiners have failed to keep percentage increases in inventories in line with demand increases. Take a look at the left chart. Annual figures for this chart are averages of monthly inventories during the year.

The trend line for the period has a slight downward slope, but nothing to compare with the sharp downtrend in demand gains. The trend line eases off from 5.71% in 1950 to 3.66% in 1960. Compare that with 8.17% down to 0.96% on the demand chart.

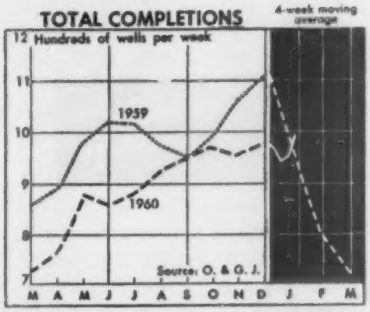
Because of changes in marketing areas, increases in number of grades, concentration of refining capacity by area, and transportation changes, there may be a need for higher percentage gains in stocks than in demand, but it is difficult to justify the 4% gain in stocks for 1960.

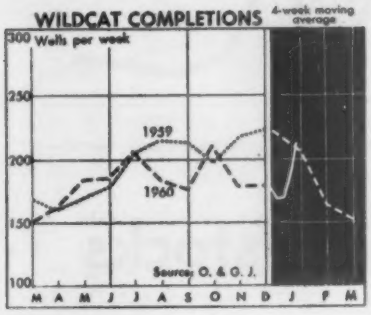
Even with a 2% gain in gasoline demand this year, there will be no need for a gain in average gasoline stocks. Since January's gasoline stocks have been higher than a year ago, a cut is in order for some of the other months. Early reductions will pay higher dividends.

If refiners push runs this spring, clean tanks will be filled with gasoline when distillate stocks start to build. That's a perfect diagram for a soft gasoline market.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,184,775	DOWN	8,210	DOWN	18,221
Crude stocks	236,408,000	DOWN	2,834	DOWN	12,300
Completions	828	DOWN	413	DOWN	15
Refinery runs	8,401,000	UP	44,000	UP	252,000
Gasoline stocks	209,954,000	UP	5,187,000	UP	6,770,000
Kerosine stocks	28,375,000	DOWN	451,000	UP	3,350,000
Distillate stocks	115,571,000	DOWN	7,655,000	DOWN	10,914,000
Residual stocks	44,391,000	DOWN	844,000	DOWN	3,538,000
Four-product stocks	398,291,000	DOWN	3,763,000	DOWN	4,332,000
Total imports	2,253,800	UP	508,700	UP	75,200





Active Rotary Rigs

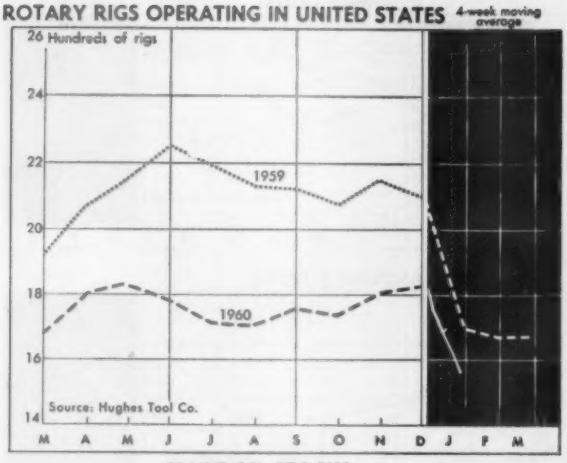
	1-30-61	1-23-61	2-1-60
Alabama	7	7	4
Alaska	7	7	(*)
Arkansas	10	13	13
Arizona	1	1	0
California	76	76	69
Land	72	72	64
Offshore	4	4	5
Colorado	26	25	27
Florida	3	3	2
Land	3	3	1
Offshore	0	0	1
Georgia	0	1	0
Illinois	22	31	24
Indiana	3	2	7
Iowa	0	0	1
Kansas	91	92	117
Kentucky	5	4	10
Louisiana	244	254	288
North	23	24	35
S. Inland waters	91	92	113
S. Land	78	85	89
Offshore	52	53	51
Michigan	16	20	35
Mississippi	41	38	72
Missouri	1	0	1
Montana	21	18	10
Nebraska	17	18	19
Nevada	1	1	0
New Mexico	100	97	96
North Dakota	11	10	19
Ohio	4	4	2
Oklahoma	162	169	177
Oregon	1	1	0
Pennsylvania	8	11	11
South Dakota	0	0	3
Texas	550	557	611
S. Inland waters	5	5	6
S. Land	153	145	173
Offshore	2	2	0
North	46	44	47
Panhandle	54	57	42
East	46	50	44
West Central	†145	†145	211
West	99	109	88
Utah	25	27	28
Washington	2	2	1
West Virginia	4	4	3
Wyoming	46	51	60
Total U. S.	1,505	1,544	1,710
Western Canada	186	162	240
Eastern Canada	0	0	4
Grand total	1,691	1,706	1,954

Hughes Tool Co. report. *Data first reported 4-4-60. †Stephens and Eastland counties now included in West Central.

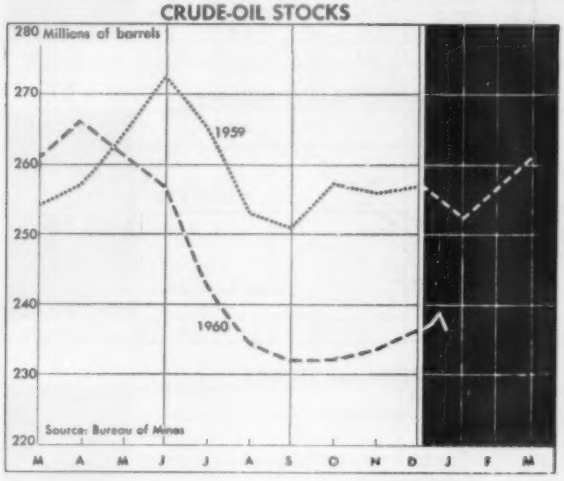
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 28, 1961

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1961	1960	Total	Crude	Cond.	Gas	Dry	1961	1960
Arkansas	11	7	0	2	2	0	51,323	39	52	1	0	0	0	1	13	14
California	31	19	0	2	6	4	130,075	173	135	2	0	0	0	2	20	34
Colorado	10	3	0	1	6	0	49,024	63	65	6	0	0	1	5	38	34
Illinois	41	14	0	0	10	17	43,946	176	213	6	0	0	0	6	36	52
Indiana	23	11	0	0	12	0	33,240	77	90	5	1	0	0	4	14	30
Kansas	134	64	0	6	48	16	232,056	443	310	13	1	0	0	12	81	96
Kentucky	12	0	0	1	11	0	17,155	128	209	1	0	0	0	1	13	25
Louisiana	54	21	0	6	27	0	365,600	386	323	5	0	0	0	5	52	44
North	25	9	0	4	12	0	95,396	126	110	2	0	0	0	2	22	19
South	24	10	0	1	13	0	218,906	198	161	1	0	0	0	1	28	24
Offshore	5	2	0	1	2	0	51,298	62	52	2	0	0	0	2	2	1
Michigan	15	1	0	0	14	0	47,182	74	66	8	0	0	0	8	37	24
Mississippi	9	5	0	1	3	0	97,643	61	69	0	0	0	0	0	23	24
Montana	10	2	0	0	8	0	55,234	35	32	5	0	0	0	5	16	16
Nebraska	11	4	0	0	7	0	51,832	52	68	4	0	0	0	4	27	25
New Mexico	39	18	0	11	10	0	231,575	135	190	6	1	0	0	5	19	28
West	18	3	0	11	4	0	95,478	64	67	3	1	0	0	2	10	6
East	21	15	0	0	6	0	136,097	71	123	3	0	0	0	3	9	22
New York	0	0	0	0	0	0	0	87	25	0	0	0	0	0	0	2
North Dakota	5	3	0	0	2	0	26,488	18	27	2	0	0	0	2	3	5
Ohio	30	16	0	4	10	0	83,834	78	126	4	0	0	0	4	5	4
Oklahoma	76	42	2	5	24	3	349,669	361	346	14	5	0	0	9	55	74
Pennsylvania	0	0	0	0	0	0	0	50	6	0	0	0	0	0	4	2
Texas	257	113	14	17	109	4	1,177,404	1,320	1,616	70	9	2	2	57	305	338
Dist. 1	14	4	0	1	8	1	41,025	77	118	6	0	0	0	6	30	45
Dist. 2	6	0	1	0	5	0	44,865	83	69	3	0	0	0	3	14	18
Dist. 3	26	12	5	0	9	0	208,735	110	147	10	3	0	0	7	29	26
Dist. 4	9	4	0	0	5	0	47,575	149	153	3	0	0	0	3	10	39
East	20	9	1	0	10	0	81,760	111	137	6	0	0	0	6	28	35
Dist. 7-B	43	14	1	0	27	1	156,260	169	198	16	1	0	0	15	49	59
West	65	41	4	0	20	0	322,631	293	459	17	2	1	0	14	66	62
Dist. 9	40	14	1	1	23	1	120,112	202	259	3	0	0	1	2	38	49
Dist. 10	34	15	1	15	2	1	154,441	126	76	6	3	1	1	1	11	5
Utah	2	1	0	0	1	0	11,830	16	25	1	0	0	0	1	13	11
West Virginia	21	2	0	17	1	1	45,925	83	62	0	0	0	0	0	0	1
Wyoming	25	11	0	2	12	0	134,513	89	92	7	0	0	1	6	36	43
Misc. (Tenn.)	12	4	0	0	8	0	4,598	42	24	12	4	0	0	8	36	18
Total U. S.	828	361	16	75	331	45	3,240,146	3,986	4,171	172	21	2	4	145	848	944
Total prev. week	1,241	535	53	103	485	65	5,267,765	.....	.....	299	21	9	7	262	.....	.....
Cum. 1961	3,986	1,776	145	358	1,501	206	16,858,226	.....	.....	848	69	16	26	737	.....	.....
Cum. 1960	4,171	1,960	161	326	1,612	112	18,380,069	.....	.....	944	79	12	26	827	.....	.....
Western Canada	36	24	0	7	4	1	229,776	185	147	6	2	0	3	1	49	38

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	1-21-61	1-14-61	1-23-60
Pennsylvania	2,145	2,182	2,287
Other Appalachian	1,290	1,231	2,058
Illinois, Indiana, Michigan	8,177	8,198	9,426
Nebraska and North Dakota	2,786	2,818	2,690
Kansas	9,315	9,172	9,324
Oklahoma	15,580	15,735	16,574
Arkansas	1,606	1,731	2,139
Louisiana	19,109	18,921	18,094
North	3,190	3,492	3,072
South	15,919	15,429	15,022
Mississippi, Alabama, Florida	2,013	1,985	2,571
New Mexico	7,473	7,548	7,693
Texas	99,918	100,961	107,261
East Texas	8,421	8,139	8,015
West Texas	45,859	46,234	49,924
Texas Gulf	17,575	18,426	19,937
Other Texas	28,063	28,162	29,385
Wyoming	17,332	17,479	17,269
Other Rocky Mountain	9,594	10,468	9,243
California	25,220	24,773	28,261
Foreign	†14,850	16,040	13,818
Total	236,408	239,242	248,708

*Bureau of Mines. †Includes 5,055,000 bbl. in California.

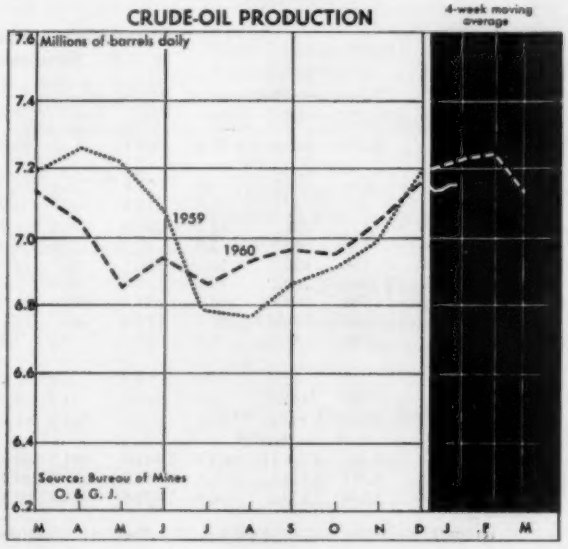
DAILY AVERAGE PRODUCTION FOR WEEK

	January 28, 1961			Jan. 21
	Crude oil	Lease condensate	Total	total
Alabama	21,350	.....	21,350	21,200
Alaska	6,400	.....	6,400	6,500
Arkansas	77,875	150	78,025	78,000
California	830,600	.....	830,600	832,000
Colorado	131,800	.....	131,800	132,200
Eastern	39,500	.....	39,500	39,000
Florida	1,000	.....	1,000	1,000
Illinois	209,900	.....	209,900	215,400
Indiana	33,400	.....	33,400	34,200
Kansas	†310,875	.....	†310,875	†308,185
Kentucky	56,700	.....	56,700	59,300
Louisiana	983,475	138,700	1,122,175	1,120,600
North	105,475	6,200	111,675	110,100
South	878,000	132,500	1,010,500	1,010,500
Michigan	48,600	.....	48,600	48,500
Mississippi	146,800	4,150	150,950	150,950
Montana	81,100	.....	81,100	80,000
Nebraska	68,250	.....	68,250	65,000
Nevada	50	.....	50	100
New Mexico	285,000	8,200	293,200	293,200
North Dakota	66,800	.....	66,800	66,000
Oklahoma	†527,900	.....	†527,900	†536,650
Texas	2,512,000	97,850	2,609,850	2,609,850
Dist. 1	42,000	3,700	45,700	45,700
Dist. 2	106,000	8,600	114,600	114,600
Dist. 3	321,000	39,000	360,000	360,000
Dist. 4	179,000	15,000	194,000	194,000
Dist. 5	27,000	500	27,500	27,500
Dist. 6	112,000	10,000	122,000	122,000
East Texas field	133,000	.....	133,000	133,000
Dist. 7-B	127,000	400	127,400	127,400
Dist. 7-C	115,000	3,550	118,550	118,550
Dist. 8	1,056,000	12,000	1,068,000	1,068,000
Dist. 9	193,000	2,500	195,500	195,500
Dist. 10	101,000	2,600	103,600	103,600
Utah	112,800	.....	112,800	114,500
Wyoming	382,950	.....	382,950	380,000
Others	‡600	.....	‡600	†650
Total U. S.	6,935,725	249,050	7,184,775	7,192,985
Change from previous week, down			8,210	
Canada	†598,300	.....	†598,300	†624,000

Total U. S. prod., Jan. 1-Jan. 28 ..... 200,697,600 bbl.
Same period last year (crude plus cond.) ..... *202,282,700 bbl.

*Includes 6,051,200 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Arizona.

CRUDE-OIL PRODUCTION



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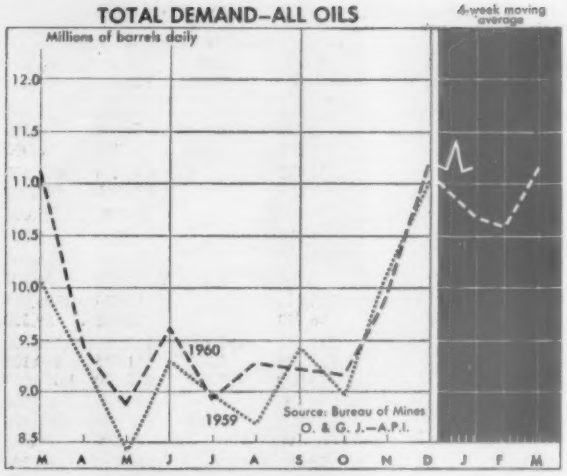

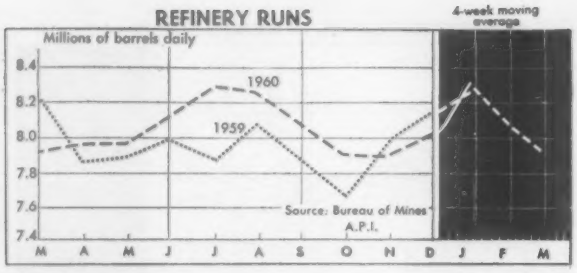

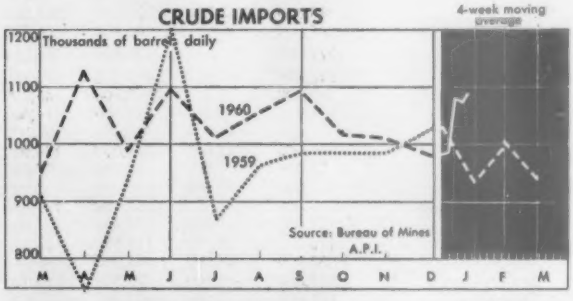

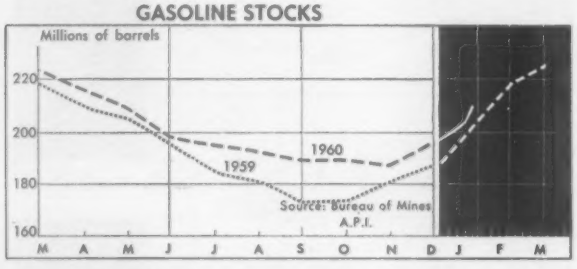

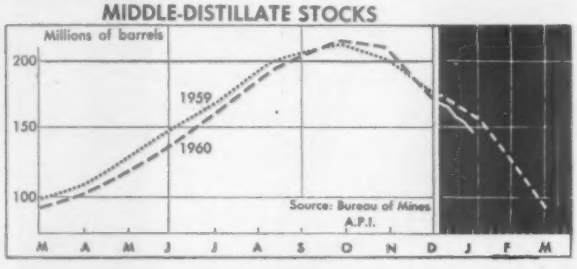

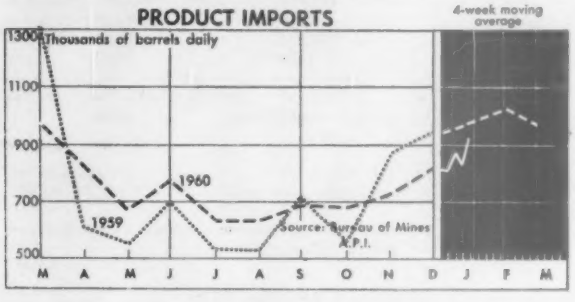

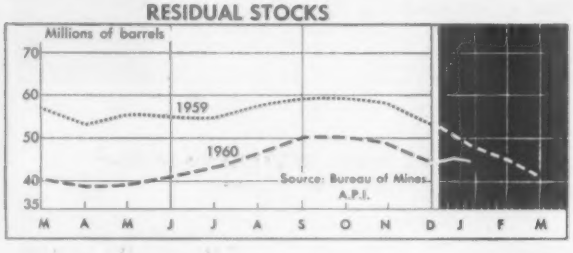

API REFINERY REPORT—JANUARY 27, 1961

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, January 1960 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,200	529.6	49.4	408.7	171.1	45,333	10,741	40,391	12,390	1,123	493.3	39.9	322.2	160.7
Appalachian:														
District 1	106	41.7	3.6	27.6	15.4	5,778	681	3,073	598	103	39.3	4.0	23.5	15.5
District 2	95	47.3	7.7	17.9	10.9	3,302	396	1,355	347	108	54.6	7.9	20.8	17.4
Ind., Ill., Ky.	1,523	751.7	68.4	369.9	173.6	35,994	5,269	20,410	5,797	1,569	801.6	82.2	364.0	238.1
Minn., Wis., Dak.	133	62.1	2.9	30.1	24.1	6,950	945	6,227	617	125	59.9	7.5	26.6	21.7
Okla., Kans., Mo.	766	429.6	22.1	198.7	25.7	18,763	1,217	10,567	855	761	411.5	15.7	206.8	31.4
Inland Texas	293	208.4	10.0	37.4	20.9	7,974	419	1,338	2,495	302	211.1	10.9	52.3	22.6
Texas Gulf Coast	1,986	998.6	158.3	564.4	157.4	31,652	3,178	10,217	6,103	1,937	974.5	150.1	487.6	158.8
La. Gulf Coast	709	386.0	69.3	175.6	46.7	11,161	2,258	4,328	1,220	691	362.1	78.9	151.3	53.9
N. La. and Ark.	108	63.6	4.6	23.1	7.4	5,842	1,247	2,326	144	103	71.5	6,8	22.5	8.7
Rocky Mountain:														
New Mexico	25	11.4	0.9	4.1	4.9	825	46	126	32	24	13.4	0.1	4.4	2.3
Other	288	141.8	5.4	63.4	33.4	6,922	357	2,329	1,027	297	142.5	3.3	69.3	35.5
West Coast	1,169	539.6	42.1	222.1	262.2	29,458	1,621	12,884	12,766	1,136	548.4	29.7	180.1	280.2
Jan. 27, 1961	8,401	4,211.4	444.7	2,143.0	953.7	209,954	28,375	115,571	44,391	8,279	4,183.7	437.0	1,931.4	1,046.8
Jan. 20, 1961	8,357	4,128.9	474.1	2,117.0	900.9	204,767	28,826	123,226	45,235	.....	.....	.....	.....	.....
Jan. 29, 1960	8,149	3,938.6	346.9	1,938.6	983.4	203,184	25,025	126,485	47,929	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Julesburg	Wyo. (sour)
14-14.9	$1.86	....	....	....	....	....	....	....	....
15-15.9	1.93	....	....	....	....	....	....	....	1.81
16-16.9	2.00	....	....	....	....	....	....	....	1.86
17-17.9	2.06	....	....	....	....	....	....	....	1.96
18-18.9	2.13	....	....	....	....	....	....	....	1.96
19-19.9	2.20	....	....	....	....	....	....	....	2.01
20-20.9	2.27	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.33	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.40	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.23-3.53
Van	3.08
Pennsylvania Grade:	
Bradford	$4.75-4.80
Middle District	4.52
Southwest Pennsylvania	4.25
West Virginia	4.17
Buckeye Grade	4.08
Illinois Basin	3.00-3.05

Foreign

Middle East, Persian Gulf: (cargoes f.o.b. lifting port)	
Arabian, 34.0°-34.9°, Ras Tanura	$1.80
Iranian, 34.0°-34.9°, Bandar Mashur	1.78
Iranian, 34.0°-34.9°, Abadan	1.73
Iraq, 35.0°-35.9°, Fao	1.72
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.59
Qatar, 41.0°-41.9°, Umm Said	1.95
Middle East, E. Mediterranean:	
Arabian, 34.0°-34.9°, Sidon	$2.17
Iraq, Mosul-Kirkuk, 35.0°-35.9°, Tripoli	2.19
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 36°	2.42
Canada:	
Leduc-Woodbend	$2.53
Redwater (Alta.)	2.42
Weyburn (light)	2.06
★ Midale C	1.70
Venezuela:	
Cumbarebo, 47°-47.9°, Tucupido	3.34
San Joaquin, 40°-40.9°, Puerto La Cruz	3.08
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

★ Gulf-NY, clean (ATRS+45%)	$4.13
Gulf-NY, dirty (ATRS+12.5%)	3.21
★ Carib.-NY, dirty (ATRS – 52.5%)	1.31
PG-UK, dirty (Scale – 52.5%) (29s. 0d.)	4.06
★ PG-NY, dirty (USMC – 65%)	4.45

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):	
Regular (91 octane)	12.00-12.50
Premium (99 octane)	14.75-15.25
Natural gasoline (26-70)	4.5
Breckenridge	4.0
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	11.00
Regular (92 octane)	11.25
Premium (98 octane)	12.25
California (rack) Los Angeles:	
Regular (90 octane)	11.30
Premium (95 octane)	12.30
Premium (100 octane)	13.80
Caribbean area (cargoes):	
Regular (87 octane)	10.125-10.25
Premium (97 octane)	11.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):	
Kerosine 42-44	10.875
Diesel oil (58 d.i. and above)	10.50
Distillate No. 1	10.50
Distillate No. 2	9.50
Gulf Coast (cargoes):	
★ Kerosine 41-43	10.00
Distillate No. 2	9.25
New York Harbor (barges):	
Kerosine 42-43	11.15
Distillate No. 2	10.15
Diesel fuel, 48-52 d.i.	10.55
Caribbean area (cargoes):	
★ Distillate No. 2	8.625

Residual Fuel (Bbl.)

Mid-Continent (Group 3):	
Residual fuel (max 1% S)	$1.90
Gulf Coast (cargoes):	
Bunker C fuel	2.30
New York Harbor (barges):	
Bunker C fuel	2.52
Caribbean (cargoes):	
Bunker C	2.10
California (rack):	
Bunker C fuel, Los Angeles	2.25

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4—L.V.G. 5¼" x 15", 3000 W.P.
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1—Worthington 10" x 9", 125 W.P.
1—Gardner-Denver Vertical Air Compressor 2" x 5½", 1500 W.P.
1—Gardner-Denver Unit Belt Driven 7¼" x 13", 500 W.P. 14" x 13", 175 W.P. Powered by L-3000 Leroi
1—Worthington Unit Belt Driven 4⅛" x 11", 1000 W.P. Powered by W.A.K. Waukesha
1—M.A. Clark Unit Skid-Mounted 4—10½" x 8" Headers, Scrubber and building
1—Worthington Unit Belt-Driven 8⅞" x 13", 300 W.P. 4½" x 13", 1100 W.P. Inner Cooler Powered by 6G-510 Superior
1—Chicago-Pneumatic Unit Belt-Driven 14" x 13", 60 W.P. After Cooler Powered by 145 G.K.U. Waukesha
1—X.O.B. Unit 5½" x 6" x 10"

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9 MM BTU/hr.	Carbon Tubes	
7.5 MM BTU/hr.	CHROME Tubes	(2)
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2.5 MM BTU/hr.	Carbon Tubes	
2 MM BTU/hr.	Carbon Tubes	

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Tulsa, Oklahoma

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The Fish Engineering Corp.
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The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

WANTED—Manufacturers Representative now calling on oil well supply dealers to solicit orders for premium quality balls and seats on a commission basis. Excellent repeat item and good franchise to sincere man of good character. Mail resume with character references to—Foggan Precision Balls & Seats, South Side Station, Box 855, Oil City, Pennsylvania.

PETROLEUM ENGINEER

Aggressive, independent company wants engineer with 3 to 5 years combination field and supervisory experience. Waterflood evaluation, development, and operation experience helpful. Permanent Tulsa base, some travel.

Box M-258, The Oil and Gas Journal
Tulsa, Oklahoma

OUTSTANDING OPPORTUNITY

Production Engineer

Age 35-45 with five years production experience to supervise development activities of independent Rocky Mtn. area. Gas pipeline experience desirable. Reply in confidence with complete resume and compensation requirements to

Box M-260
The Oil and Gas Journal
Tulsa 1, Oklahoma

WORLD-WIDE OPPORTUNITIES FOR Outstanding Pipe Line ENGINEERS

As a result of continued growth on an international scale, PIPE LINE TECHNOLOGISTS, INC. and affiliated companies will continue to have job opportunities for experienced Pipe Line Engineers.

We have opening at both intermediate and advanced levels in both the United States and foreign locations. Normally, the initial assignment of new staff members is in our Houston headquarters with the possibility of recurring short or long term assignments in other parts of the United States and foreign countries.

Resumes, which will be kept strictly confidential, are invited from graduate engineers with experience in responsible capacities in hydraulic and mechanical design of pipe lines and pipe line facilities, including pump stations, compressor stations and terminals. Experience in estimating and economic studies also desirable. Openings also are expected for experienced construction engineers capable of being assigned as Project Engineers.

These are unusual opportunities for well-qualified men who want to work in an atmosphere where the individual can have an important impact on the overall picture by the competent handling of challenging and out-of-the-ordinary job assignments.

Salaries commensurate with training and work experience. Liberal, well-balanced employee benefit plans.

Please include in resume full particulars regarding education, experience and salary requirements. Arrangements will be made for individual interview with interested and qualified persons.

Pipe Line Technologists, Inc.
3431 West Alabama P. O. Box 22148
Houston 27, Texas

HELP WANTED

CHIEF GEOLOGIST for the State of Texas. Independent Houston producing company wants Senior Geologist for Texas, including the Gulf Coast. Preferably 15 years experience, sound educational background. Location, Houston. Box M-253, The Oil and Gas Journal, Tulsa, Oklahoma.

—SALESMAN—

Young man with oil and gas pipeline experience. Extensive travel. Salary and expenses paid. Must have good car.

BOX M-262
THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

CRUDE OIL REPRESENTATIVE

Excellent opportunity for graduate Geologist or Petroleum Engineer with 5 years experience to represent progressive independent company in North Dakota.

Must be capable of dealing with producers and handling technical problems.

Salary commensurate with background and experience, plus company car and excellent fringe benefits. Married man, age 28-40.

All replies confidential.
Box M-266, The Oil and Gas Journal
Tulsa, Oklahoma

PETROLEUM REFINERY PROCESS ENGINEER

B.S. or M.S. Chemical Engineer with three to five years experience in General Refinery Process Design, preferably with emphasis on TCC or HCC catalytic cracking, sulfuric acid alkylation, catalytic reforming, vapor recovery systems.

If interested, airmail your resume and salary requirements to:

M. D. Daeschner
Assistant Refinery Manager
COMMONWEALTH
OIL REFINING CO., INC.
P. O. Box 1406
Ponce, Puerto Rico

POSITIONS OPEN

PROCESS ENGINEER

Chemical Engineering degree required with a minimum of three years refinery experience including the operations of Fluid Catalytic Cracking Units and H.F. Alkylation Units.

MECHANICAL ENGINEER

A Mechanical Engineering degree required with a minimum of two years refinery maintenance experience in at least a foreman capacity.

FIRE MARSHAL and SAFETY INSPECTOR

Applicants should have experience as Fire Marshall and/or plant safety inspector in a refinery, chemical plant or a related industry.

These positions have been created as a result of a modernization program in a 15,000 bpd refinery. Employee benefits in effect are retirement plan, thrift plan, vacation, hospitalization and group insurance.

If interested in any of these positions send complete resume including references and salary range desired. All replies will be acknowledged and remain confidential. Mail to:

PERSONNEL DIRECTOR
MURPHY CORPORATION
Superior Refinery • Superior, Wisconsin

HELP WANTED

DRILLING and completion Engineer—graduate engineer 4-8 years experience by expanding independent. Will be responsible for field supervision of drilling operations. Complete experience resume required, Box 746, Tyler, Texas.

REFINERY process engineer for independent corporation. Cost estimating, design and drafting experience. Submit resume of experience, education and salary expected. Box M-245, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST WITH B.S. degree to work on refined wax products and emulsions. Petroleum wax laboratory. Experience required. Please submit resumé of experience and salary expected. Box M-244, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

PETROLEUM ENGINEER: Five years diversified production experience in the Rocky Mountain Area, married, age 32, will relocate. Box M-261, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE Engineer/Supervisor—Graduate ME, supplementary management training. 13 years design, cost studies, construction, operation. 8 years station, crude and products lines. 5 years process type plants. Responsible staff work and line supervision on major installations. Desire change with promising future. Box M-273, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST-PALEONTOLOGIST, B.S. 32, family, 8 years experience, subsurface, micropaleontology, administration in West Texas. Position desired; domestic, foreign, willing to work. Box M-255, The Oil and Gas Journal, Tulsa, Oklahoma.

Instrument Engineer, BS, Registered ME in California, 36, 12 years experience design, construction and operation. Recently completed 2-year contract with foreign government in Middle East, wants overseas work for American company. Box M-230, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPLORATION GEOLOGIST—35, ten years major oil company domestic experience, four years nationalized foreign company. Presently employed as Division Exploration Manager. Qualified to originate and direct sound economic exploration programs, evaluations, drilling deals, promotions, farmouts, domestic or foreign. Desire to return USA. Best references. Box M-243, The Oil and Gas Journal, Tulsa, Oklahoma.

MANAGER OF INDEPENDENT drilling and producing company, Appalachian Area, seeks position with independent or company, graduate Petroleum Engineer, 37, experienced in Appalachian and Southwest Areas, all phases of drilling and production. Excellent references: Box M-270, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE GEOLOGICAL Engineer, 37, eleven years broad experience exploitation, exploration, evaluation, and economic analyses. Presently active partner in successful consulting firm. Desires permanent employment and opportunity in field of petroleum economics and evaluation. Excellent references upon request. Box M-267, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

FOR SALE: Royalty under NE¼, 17-25N-18W, Woodward County, Oklahoma. Leased by NNG, Pure drilling SE¼; also ½ interest minerals NE¼, Section 18. Write: Box M-274, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUSCRIPTS

HAVE YOU WRITTEN A BOOK?

If you have a book manuscript or outline for a book on an oil industry engineering, operating or technical subject—we are in a position to help you get it published. Write briefly outlining what you have!

Write to —L. B. Lofton
THE OIL AND GAS JOURNAL
P. O. Box 1260—Tulsa 1, Okla.

CAPITAL NEEDED

UNDER-FINANCED Independent producing company seeks contact with group capable of underwriting part of exploration program for two year period. Excellent key personnel already retained. Geological and Land work now being done. $100,000.00 per year investment needed for 40% of deal. Box M-242, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL MAPS

CONTOURED MAPS AVAILABLE
covering approximately 90 townships in the
McALESTER BASIN
of eastern Oklahoma
Also 30 townships in southern Oklahoma
THE R. P. WILKINSON MAP COMPANY
623 Frensley, Ardmore, Oklahoma

LEASE AND DRILLING BLOCKS

WANT TO PURCHASE Gas and Oil Properties—Submit Reserve Estimates, Income, etc. Box M-210, The Oil and Gas Journal, Tulsa, Oklahoma.

40 ACRES Montgomery County, Kansas, diagonal off-set to new wildcat discovery, Peru Sand well. 500 ft. deep, ⅜ interest for sale $375.00 per ⅛th to drill No. 1. Reply: Box M-268, The Oil and Gas Journal, Tulsa, Oklahoma.

CUMBERLAND COUNTY Kentucky—600 acre lease near new shallow well flowing 400 barrels per day. Price $3.50 per acre. Small override. Write, write, phone. W. V. Cravens. Russell Springs, Kentucky.

FOR SALE: 110 acres land owners royalty in West Short Juntion Field, Cleveland County, Oklahoma. Waterflood to start soon. Can be verified with major operators. Contact Box 602, Oklahoma City, Oklahoma.

OIL LEASE CRANE County, Texas Available S/239 acres, Section 18, Block B-28, PSL, two miles from new gas discovery Section 22, Blk. 4, H&TC, Hill & Meeker well. Quick action, address landowner: Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

AUCTION SALE

1463.9 Acres Oil and Gas Leases
Dewey & Woodward Counties
February 16, 1961, at 2 o'clock P.M. in District Court Room, Taloga, Oklahoma

The undersigned trustee under court order will sell at public auction to the highest bidder at the above day and hour oil and gas leases covering 26 different tracts all for a term of ten years from the dates thereof on lands in Dewey and Woodward Counties, Oklahoma. Said leases are on forms customarily used in the industry. One is a paid up lease, the remainder are normal in their provisions as to delay rentals. None have been drilled. All inquiries as to dates of leases, description of lands covered, terms of sale, should be addressed to the undersigned trustee.

E. S. COLLIER, TRUSTEE
TALOGA, OKLAHOMA

NOTICE

SALE OF OIL AND GAS MINING LEASES TRIBAL AND ALLOTTED INDIAN LANDS

DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Fort Peck Indian Agency
Poplar, Montana

SEALED BIDS will be received until 10:00 A. M. Mountain Standard Time, February 14, 1961, and opened at that time at the Fort Peck Indian Agency, Poplar, Montana, for the leasing of 46 tracts of Tribal land comprising 7,460.48 acres and 133 tracts of individually owned trust or restricted Indian lands comprising 33,709.93 acres located in Roosevelt County, Montana for oil and gas mining purposes.

DETAILS of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent, Fort Peck Indian Agency, Poplar, Montana, or telephone Poplar, PO-8-3441.

LEASE AND DRILLING BLOCKS

OHIO AND WEST VIRGINIA acreage for sale close to Big Play. Specialize in 10-15 thousand acre blocks or will lease on your form anywhere in the East. David Law, 716 Union Trust Bldg., Parkersburg, West Virginia. Phone: HU 5-6446.

OIL AND GAS LEASE
approx.
600,000 acres

For participation or sale—covering the entire coastline of a southeastern coastal state on their entire tidelands and marshlands.

Strong potential for gas and oil discovery. Excellent geology.

Do not respond unless financially able to engage in this type exploration. Owner.

Box M-252
The Oil and Gas Journal
Tulsa, Oklahoma

NOTICE

SALE OF OIL AND GAS MINING LEASES TRIBAL AND ALLOTTED INDIAN LANDS
SALE NO. 12

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
Crow Indian Agency
Crow Agency, Montana

Sealed bids will be received until February 16, 1961, 2:00 o'clock, P.M., Mountain Standard Time, and opened at that time in the office of the Crow Indian Agency, Crow Agency, Montana, for the leasing of 5,280.00 acres of tribal land and 1,320.00 acres of allotted lands all located in Twp. 6 South, Rge. 32 East, Big Horn County, Montana, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the inquiry to the Superintendent of Crow Indian Agency, at Crow Agency, Montana.

BUSINESS OPPORTUNITIES

ESTABLISHED manufacturer's agent for production and subsurface equipment is now in position to handle effectively another line in Texas Gulf Coast and South Texas area. Bill Patton, 453 Haraldson Dr., Corpus Christi, Texas.

BUSINESS SERVICE

DELAWARE CORPORATION formed and serviced. American Guaranty & Trust Company. P. O. Box 487, Wilmington, Delaware.

CLIENTS WANTED

Expanding Tulsa consulting engineering firm desires additional clients. Our staff of registered professional engineers offers complete oil field engineering service: Exploration (geological, seismic, radioactivity), Mapping, Drilling-Completion-Production Supervision, Reservoir and Property Evaluations, Property Acquisition and Sale. We can serve as your engineering department and field force or augment your present one—anywhere, anytime—per diem, retainer, or contract. We welcome inquiries from responsible principals—strictest confidences practiced.

Box M-240, The Oil and Gas Journal
Tulsa, Oklahoma

BUSINESS SERVICE

INVENTORS

Do you want your drilling or production speciality or process developed and marketed? Either patented or applied for. Describe briefly; mail to Box M-259, The Oil and Gas Journal, Tulsa, Oklahoma. If interested, principal will negotiate; if not, will promptly advise.

No. 6 Sciara Istambul
Tripoli — Libya
P. O. Box 1044
Cable: BURCOL, Tel. Tripoli 6511

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LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 40 acres of land in one parcel within the known geologic structure of a producing oil or gas field, undefined, in Allegan County, Michigan, will be offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 1:00 P.M., E.S.T. March 22, 1961, when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C. H. K. Scholl, Manager.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 360.06 acres of land in three parcels within the known geologic structure of the Lake Bistineau Field, Louisiana, will be offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 1:00 P.M., E.S.T. March 15, 1961, when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Manager, Eastern States Land Office, Bureau of Land Management, Washington 25, D. C. H. K. Scholl, Manager.

LEGAL

SEALED BIDS will be received until 10:00 A.M. Mountain Standard Time, February 23, 1961, and opened at that time in the office of the Navajo Indian Agency, Window Rock, Arizona, for oil and gas leases, on 56 tracts of tribal lands, totaling approximately 95,130.48 acres, located in San Juan County, New Mexico.
Details of the lease offering and filing of bids may be obtained by addressing an inquiry to the General Superintendent, Navajo Indian Agency, Attention: Branch of Realty, Window Rock, Arizona.

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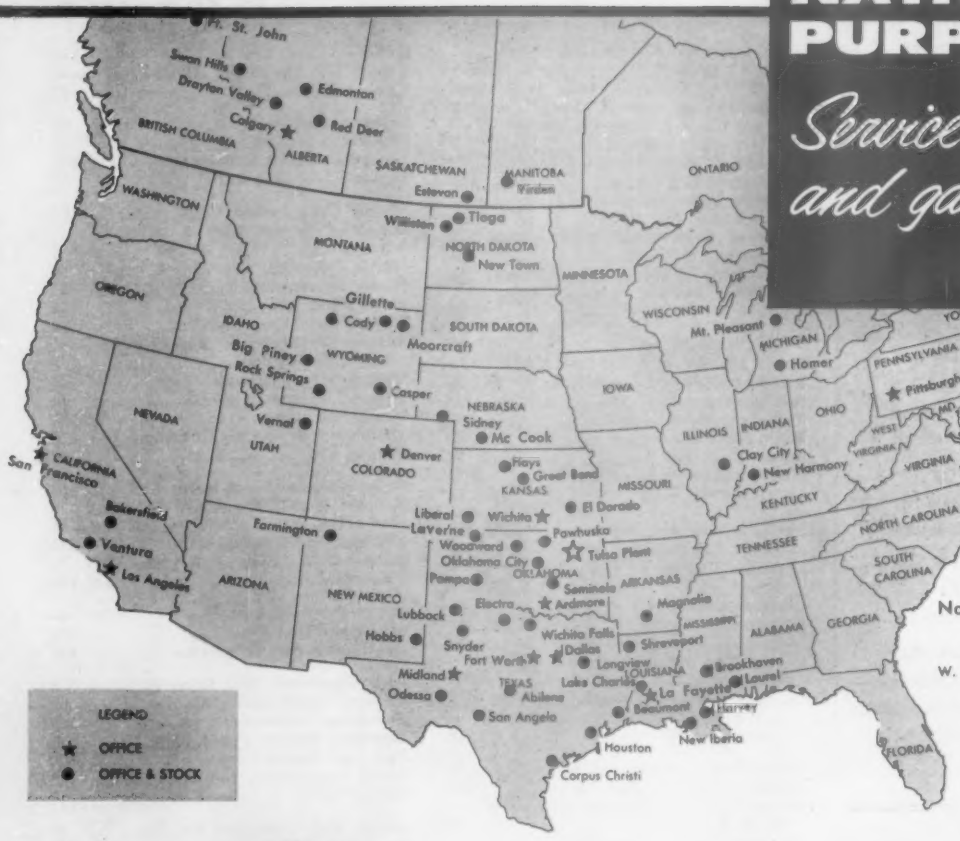

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This cross-section illustration, as visualized by an engineer, shows a formation being notched with Abrasijet* — the Dowell-developed abrasive jetting service. The drawing was based on tests in which formation samples were notched with Abrasijet.

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